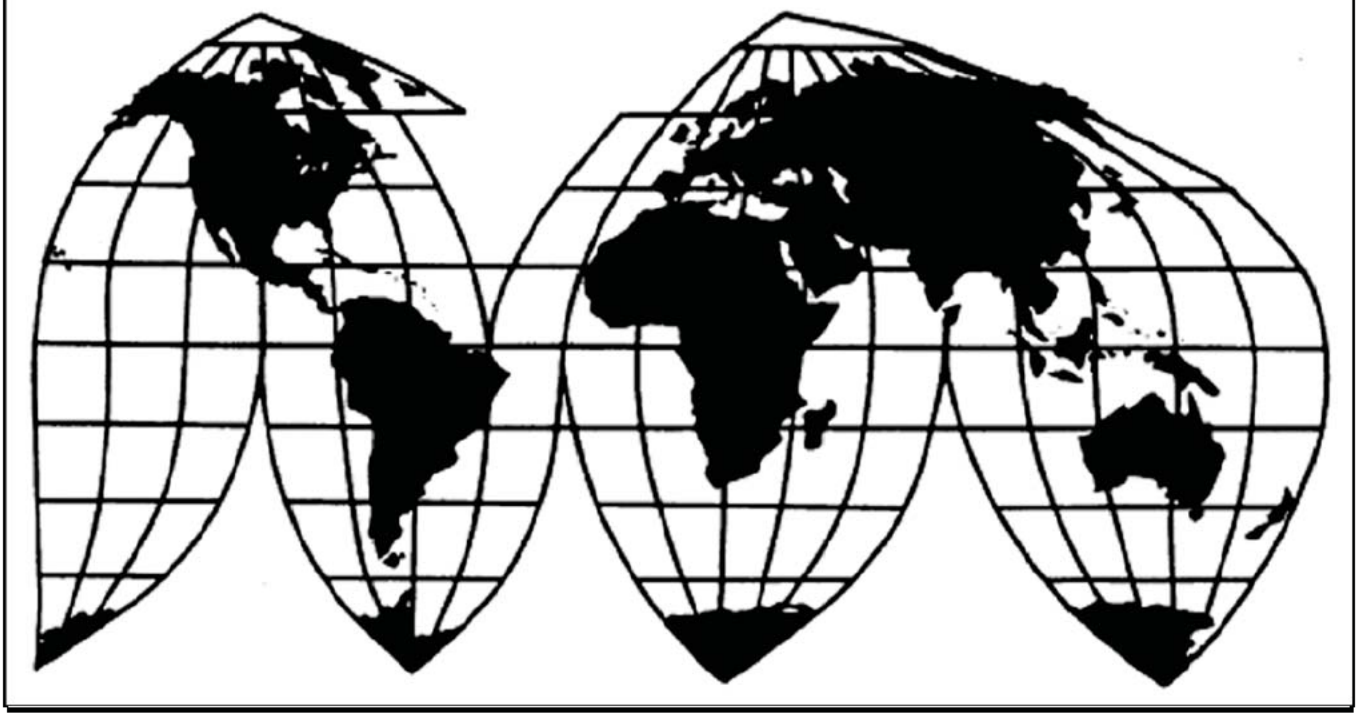
In the Matter of

Certain MEMS Devices and Products Containing Same

Investigation No. 337-TA-700

Publication 4294 **November 2011**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

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Washington, DC 20436
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In the Matter of

Certain MEMS Devices and Products Containing Same

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING SAME**	**Investigation No. 337-TA-700**

NOTICE OF COMMISSION DECISION TO AFFIRM-IN-PART AND REVERSE-IN-PART A FINAL INITIAL DETERMINATION FINDING A VIOLATION OF SECTION 337; ISSUANCE OF A LIMITED EXCLUSION ORDER; AND TERMINATION OF THE INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to affirm-in-part and reverse-in-part a final initial determination ("ID") of the presiding administrative law judge ("ALJ") finding a violation of section 337 by respondents in the above-captioned investigation, and has issued a limited exclusion order directed against products of respondents Knowles Electronics LLC ("Knowles") of Itasca, Illinois and Mouser Electronics, Inc. ("Mouser") of Mansfield, Texas.

FOR FURTHER INFORMATION CONTACT: Clint Gerdine, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-5468. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on January 5, 2010, based on a complaint filed on December 1, 2009, by Analog Devices, Inc. ("Analog Devices") of Norwood, Massachusetts. 75 *Fed. Reg.* 449-50 (January 5, 2010). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain microelectromechanical systems

("MEMS") devices and products containing the same by reason of infringement of certain claims of U.S. Patent Nos. 7,220,614 ("the `614 patent") and 7,364,942 ("the `942 patent"). The complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337. The complaint named as respondents Knowles and Mouser.

On December 23, 2010, the ALJ issued his final ID finding a violation of section 337 by respondents as to the `942 patent only, and issued his recommended determinations on remedy and bonding. On January 18, 2011, respondents, Analog Devices, and the Commission investigative attorney ("IA") each filed a petition for review of the final ID, and each party filed a response on January 27, 2011.

On March 7, 2011, the Commission determined to review: (1) the ALJ's construction of the claim term "oven" relating to both the `614 and `942 patents; (2) the ALJ's construction of the claim term "sawing" relating to both the `614 and `942 patents; (3) the ALJ's determination that the accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent; (4) the ALJ's finding that U.S. Patent No. 5,597,767 ("the `767 patent") does not incorporate by reference U.S. Patent Nos. 5,331,454 ("the `454 patent") and 5,512,374 ("the `374 patent"); (5) the ALJ's finding that claims 2-6 and 8 are infringed by the accused process; (6) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent, and claims 2-6 and 8 of the `942 patent, are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent; (7) the ALJ's findings that claims 34-35 and 38-39 of the '614 patent are not obvious, under 35 U.S.C. § 103, in view of the `767 patent and the Sakata et al. ("Sakata") prior art reference; and (8) the ALJ's finding that the technical prong of the domestic industry requirement is satisfied as to both the `614 and `942 patents. The determinations made in the final ID that were not reviewed became final determinations of the Commission by operation of rule. *See* 19 U.S.C. § 210.42(h).

The Commission requested the parties to respond to certain questions concerning the issues under review and requested written submissions on the issues of remedy, the public interest, and bonding from the parties and interested non-parties. 74 *Fed. Reg.* 13433-34 (March 11, 2011).

On March 18 and March 25, 2011, respectively, complainant Analog Devices, respondents, and the IA each filed a brief and a reply brief on the issues for which the Commission requested written submissions. Also, on March 21, 2001, respondents filed a motion for leave to file a corrected submission that clarified that the March 18, 2011 submission was filed on behalf of both Knowles and Mouser. On March 29, 2011, respondents filed a motion for leave to file a corrected submission that strikes a portion of their initial brief. On March 31, 2011, respondents filed notice of their withdrawal of their March 29, 2011 motion. The Commission has determined to grant respondents' remaining motion of March 21, 2011.

Having reviewed the record in this investigation, including the final ID and the parties' written submissions, the Commission has determined to affirm-in-part and reverse-in-part the

ID's findings under review. Particularly, the Commission has reversed the ALJ's finding and has determined that the `767 patent incorporates by reference the `374 and `454 patents.

The Commission has affirmed all other issues under review including the following: (1) the ALJ's construction of the claim term "oven" relating to both the `614 and `942 patents; (2) the ALJ's construction of the claim term "sawing" relating to both the `614 and `942 patents; (3) the ALJ's determination that the accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent; (4) the ALJ's finding that claims 2-6 and 8 of the `942 patent are infringed by the accused process; (5) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent, and claims 2-6 and 8 of the `942 patent, are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent; (6) the ALJ's findings that claims 34-35 and 38-39 of the '614 patent are not obvious, under 35 U.S.C. § 103, in view of the `767 patent and Sakata; and (7) the ALJ's finding that Analog Devices satisfies the technical prong of the domestic industry requirement with respect to the `614 and `942 patents, based on his finding that respondents' argument based on *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1313-1321 (Fed. Cir. 2005), is waived. The Commission has taken no position on the ALJ's finding that the domestic industry is satisfied even if respondents' argument based on *NTP* is not waived. These actions result in a finding of a violation of section 337 with respect to claims 2-6 and 8 of the '942 patent.

Further, the Commission has made its determination on the issues of remedy, the public interest, and bonding. The Commission has determined that the appropriate form of relief is a limited exclusion order prohibiting the unlicensed entry of MEMS devices and products containing the same that infringe claims 2-6 and 8 of the `942 patent that are manufactured abroad by or on behalf of, or are imported by or on behalf of, Knowles or Mouser, or any of their affiliated companies, parents, subsidiaries, licensees, contractors, or other related business entities, or successors or assigns.

The Commission further determined that the public interest factors enumerated in section 337(d)(1) (19 U.S.C. § 1337(d)(1)) do not preclude issuance of the limited exclusion order. Finally, the Commission determined that no bond is required to permit temporary importation during the period of Presidential review (19 U.S.C. § 1337(j)). The Commission's order and opinion were delivered to the President and to the United States Trade Representative on the day of their issuance.

The Commission has terminated this investigation. The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42, 210.45, and 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R.§§ 210.42, 210.45, 210.50).

By order of the Commission.

James R. Holbein
Acting Secretary to the Commission

Issued: May 10, 2011

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING SAME	**Inv. No. 337-TA-700**

LIMITED EXCLUSION ORDER

The Commission has determined that there is a violation of section 337 of the Tariff Act of 1930, as amended, §19 U.S.C. 1337, in the unlawful importation, sale for importation, and sale after importation by Respondents Knowles Electronics LLC and Mouser Electronics, Inc. of certain microelectromechanical systems ("MEMS") devices and products containing the same by reason of infringement of claims 2-6 and 8 of U.S. Patent No. 7,364,942.

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission has made its determination on the issues of remedy, the public interest, and bonding. The Commission has determined that the appropriate form of relief is a limited exclusion order prohibiting entry of infringing MEMS devices and products containing the same that are manufactured abroad by or on behalf of, or imported by or on behalf of Respondents.

The Commission has further determined that the public interest factors enumerated in 19 U.S.C. § 1337(d) do not preclude issuance of the limited exclusion order, and that respondents may import without posting bond during the period of Presidential review.

Accordingly, the Commission hereby **ORDERS** that:

1. MEMS devices and products containing the same that infringe one or more of claims 2-6 and 8 of U.S. Patent No. 7,364,942, and that are manufactured abroad by or on behalf

of, or imported by or on behalf of Respondents or any of their affiliated companies, parents, subsidiaries, successors, assigns, or other related business entities are excluded from entry for consumption into the United States, entry for consumption from a foreign trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, except under license of the patent's owner or as provided by law.

2. Products that are excluded by paragraph 1 of this Order are entitled to entry for consumption into the United States, entry for consumption from a foreign trade zone, or withdrawal from a warehouse for consumption, without posting bond pursuant to subsection (j) of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337(j), and the Presidential Memorandum for the United States Trade Representative of July 21, 2005 (70 *Fed. Reg.* 43251), from the day after this Order is received by the United States Trade Representative until such time as the United States Trade Representative notifies the Commission that this action is approved or disapproved but, in any event, not later than 60 days after the date of receipt of this action.

3. At the discretion of U.S. Customs and Border Protection ("CBP") and pursuant to procedures it establishes, persons seeking to import MEMS devices and products containing the same that are potentially subject to this Order may be required to certify that they are familiar with the terms of this Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraph 1 of this Order. At its discretion, CBP may require persons who have provided the certification described in this paragraph to furnish such records or analyses as are necessary to substantiate the certification.

4. In accordance with 19 U.S.C. § 1337(l), the provisions of this Order shall not

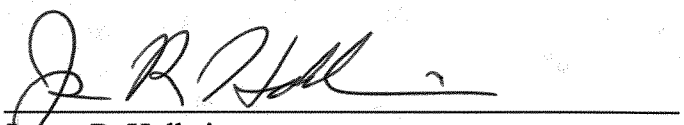
apply to MEMS devices and products containing the same that are imported by and for the use of the United States, or imported for, and to be used for, the United States with the authorization or consent of the Government.

5. The Commission may modify this Order in accordance with the procedures described in section 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

6. The Secretary shall serve copies of this Order upon each party of record in this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and CBP.

7. Notice of this Order shall be published in the *Federal Register*.

By Order of the Commission.



James R. Holbein
Acting Secretary to the Commission

Issued: May 10, 2011

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME **337-TA-700**

CERTIFICATE OF SERVICE

I, James R. Holbein, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, Kecia J. Reynolds, Esq., and the following parties as indicated, on **May 10, 2011**.

James R. Holbein, Acting Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

On Behalf of Complainant Analog Devices, Inc.:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, L.L.P.
1200 Seventeenth Street, NW
Washington, DC 20036

( ) Via Hand Delivery
(x) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

On Behalf of Respondents Knowles Electronics LLC and Mouser Electronics, Inc.:

Sturgis M. Sobin, Esq.
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, NW
Washington, DC 20004-2401

( ) Via Hand Delivery
(x) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of **CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING SAME**	**Investigation No. 337-TA-700**

COMMISSION OPINION

I. SUMMARY

On December 23, 20100, the presiding administrative law judge ("ALJ") issued his final initial determination ("ID") in the above-captioned investigation, finding a violation of section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337, as amended ("section 337"). The Commission determined to review several of the ALJ's determinations with respect to the patents at issue, U.S. Patent Nos. 7,220,614 ("the `614 patent") and 7,364,942 ("the `942 patent"). On review, the Commission affirms in part, modifies in part, and reverses in part the ALJ's final ID, and finds a violation of section 337 with respect to the `942 patent.

II. BACKGROUND

The Commission instituted this investigation on January 5, 2010, based on a complaint filed on December 1, 2009, by Analog Devices, Inc. ("Analog Devices") of Norwood, Massachusetts. 75 *Fed. Reg.* 449-50 (January 5, 2010). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain microelectromechanical systems ("MEMS") devices and products containing the same by reason of infringement of claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent, and claims 1-6 and 8 of the `942 patent. The complaint further alleged that an

industry in the United States exists as required by subsection (a)(2) of section 337. The Commission's notice of investigation named as Respondents Knowles Electronics LLC ("Knowles") of Itasca, Illinois and Mouser Electronics, Inc. ("Mouser") of Mansfield, Texas (collectively, "Respondents").

On December 23, 2010, the ALJ issued his final ID finding a violation of section 337 by Respondents as to the `942 patent based on his finding that Respondents' accused process infringes claims 2-6 and 8 of this patent. The ALJ issued his recommended determinations on remedy and bonding with his final ID. On January 18, 2011, Respondents, Analog Devices, and the Commission investigative attorney ("IA") each filed a petition for review of the final ID, and each party filed a response on January 27, 2011.[2]

On March 7, 2011, the Commission determined to review the following: (1) the ALJ's construction of the claim term "oven" relating to the `614 and `942 patents; (2) the ALJ's construction of the claim term "sawing" relating to both asserted patents; (3) the ALJ's determination that Respondents' accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent; (4) the ALJ's finding that U.S. Patent No. 5,597,767 ("the `767 patent") does not incorporate by reference U.S. Patent Nos. 5,331,454 ("the `454 patent") and 5,512,374 ("the `374 patent"); (5) the ALJ's finding that claims 2-6 and 8 are infringed by the accused process; (6) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent, and claims 2-6 and 8 of the `942

[2] *See* Petition for Review (and Response) of Initial Determination of Respondents ("Respondents' Pet.," "Respondents' Resp."); IA's Contingent Petition for Review (and Response) of the Initial Determination ("IA's Pet.," "IA's Resp."); Analog Devices' Contingent Petition for Review (and Response) of Initial Determination Finding a Violation of 19 U.S.C. § 1337(a)(1) ("Analog Devices' Pet.," "Analog Devices' Resp.").

patent, are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent; (7) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent are not obvious, under 35 U.S.C. § 103, in view of the `767 patent and the reference by Sakata *et al.* entitled "Anti-Stiction Silanization Coating to Silicon Micro-Structures by a Vapor Phase Deposition Process" ("Sakata"); and (8) the ALJ's finding that the technical prong of the domestic industry requirement is satisfied as to both the `614 and `942 patents.

The ALJ's determinations made in the final ID that were not reviewed became final determinations of the Commission by operation of rule. *See* 19 U.S.C. § 210.42(h).

The Commission requested written submissions from the parties on certain claim construction and invalidity issues under review. 74 *Fed. Reg.* 15301-02. Further, the Commission requested written submissions on the issues of remedy, the public interest, and bonding from interested non-parties as well as the parties to the investigation. *Id.* On March 18 and March 25, 2011, respectively, complainant Analog Devices, Respondents, and the IA each filed a brief and a reply brief on the issues for which the Commission had requested written submissions.[2]

After considering the written submissions, the Commission has determined to reverse the ALJ's finding that the `767 patent does not incorporate by reference the `454 patent or the content of the `374 patent. The Commission has determined to affirm the remaining issues under review (in some cases with additional or alternative reasoning as compared to the ALJ's):

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[2] *See* IA's Response (and Reply) to Commission's Request for Written Submissions on Remedy and Public Interest and Questions for Review ("IA's Sub.," "IA's Reply"); Analog Devices' Supplemental Briefing (and Reply) on Issues Identified by the Commission and Written Submissions Regarding Remedy, Bonding, and the Public Interest ("Analog Devices' Sub.," "Analog Devices' Reply"); Respondents' Response (and Reply) to Notice of Commission

(1) the ALJ's construction of the claim term "oven" relating to both the `614 and `942 patents; (2) the ALJ's construction of the claim term "sawing" relating to both the `614 and `942 patents; (3) the ALJ's determination that the accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent; (4) the ALJ's finding that claims 2-6 and 8 of the `942 patent are infringed by the accused process; (5) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent, and claims 2-6 and 8 of the `942 patent, are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent; (6) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent are not obvious, under 35 U.S.C. § 103, in view of the `767 patent and Sakata; and (7) the ALJ's finding that Analog Devices satisfies the technical prong of the domestic industry requirement with respect to the `614 and `942 patents, based on his finding that Respondents' argument based on *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1313-1321 (Fed. Cir. 2005), is waived.

A. Patents at issue

The `614 patent, entitled Wafer Level Treatment to Reduce Stiction and Passivate Micromachined Surfaces and Compounds Therefor, issued on May 22, 2007. The `942 patent issued on April 29, 2008 from a continuation application of the `614 patent and shares a common specification.[3] For both patents-in-suit, the named inventor is John R. Martin and the assignee is Analog Devices, Inc. U.S. Patent No. 5,694,740 ("the `740 patent") is prior art to the patents-in-suit and is expressly incorporated by reference into the common specification. *See* `614 patent, col. 5:46-47; `942 patent, col. 5:47-48.

Decision to Review-in-Part a Final Initial Determination and Submission Regarding Remedy, Bonding, and the Public Interest ("Respondents' Sub.," "Respondents' Reply").

[3] Because the two patents at issue (*i.e.*, the `614 and `942 patents) share a common specification, we refer to "the specification" or "the common specification" generally when discussing either

Scope of claimed technology

This investigation pertains to micromachined sensors and actuators (*e.g.*, microphones), also referred to as microelectromechanical systems ("MEMS"), that are manufactured using semiconductor technologies to form and separate wafers into discrete devices for microelectronic packaging. `942 patent, col. 1:19-23, 62-65. These inorganic microstructures have extremely clean surfaces that tend to stick together if they come into contact with one another. Such contact effectively destroys the MEMS devices. The property of sticking is called "stiction" and the concept of preventing sticking is called "anti-stiction." Antistiction treatments, *e.g.*, coatings or depositions, are commonly applied to the clean surfaces during assembly and packaging of the MEMS devices. *Id.* (col. 1:23-47).

The asserted claims of the `614 and `942 patents pertain to a process for forming durable anti-stiction surfaces on MEMS devices before the wafer is separated into dies or discrete devices for assembly into packages. *Id.* (col. 1:62-65). Some of the claims recite the use of an oven or furnace to vaporize the anti-stiction material that is deposited on the wafer to create a low-stiction surface enriched with organic material. *Id.* (cols. 17:40 to 18:10). The patent further discloses certain compounds, such as organic silicon compounds, which are effective in imparting an anti-stiction property to the chip. A thin monolayer of the material, such as in the range of 5 to 100 Angstroms, is sufficient to achieve anti-stiction. After deposition of the anti-stiction material, the wafer can be sawed or separated into multiple discrete MEMs devices. *Id.* (cols. 17:40 to 18:42).

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the `942 or `614 patents.

B. Products at Issue

Analog Devices contends that the asserted process and product-by-process claims of the `614 and `942 patents are infringed by respondent Knowles' SiSonic MEMS microphones that Knowles makes using a "dry" Self-Assembled Monolayer anti-stiction process ("the accused process"). Respondent Mouser sells and distributes the Knowles imported microphones. *See* ID at 2-3. [[

]]. A later portion of the accused process [[

]] and uses a two-step method to produce individual MEMS devices from a wafer. *See* ID at 4. [[

]].

III. DISCUSSION

For the reasons set forth below, the Commission has determined to affirm-in-part, modify-in-part, and reverse-in-part the final ID's findings under review and find a violation of section 337 by Knowles' accused process. We adopt the ALJ's findings in his final ID that are not inconsistent with our determinations and opinion.

A. The `614 and `942 patents – claim construction of "oven" and infringement

We determined to review the ALJ's construction of the limitation "oven" found in asserted claims 12, 15, and 31-32 of the `614 patent, and claim 1 of the `942 patent. *See* `614 patent, cols. 18:49-65, 19:11-26, 21:5-36; `942 patent, cols. 17:40-44, 18:1-10.

Representative claim 1 of the `942 patent reads:

1. A method for producing microelectromechanical devices comprising the steps of:

inserting a wafer having a plurality of microelectromechanical devices fabricated on a surface thereof into one of an **oven** or a furnace;

heating a compound having anti-stiction properties within said **oven** or furnace to a temperature sufficient to vaporize said compound;

depositing said vapor on said wafer surface so as to treat the surface of said wafer with said compound;

removing said wafer from said **oven** or furnace; and

sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

`942 patent, cols. 17:40-44 to 18:1-10 (emphasis added).[4]

1. *Initial determination*[5]

In construing the term "oven", the ALJ specifically referenced Figures 4 and 5 and the accompanying descriptions found in the common specification. The ALJ noted that because of an "inexact use of the term 'oven' throughout the specification," the parties dispute whether "oven" refers to the entire system of Figure 4, including components such as the reservoir, or whether it refers to only the chamber holding the wafers. *Id.* at 40.

After carefully analyzing the specification, the ALJ construed "oven" to mean "a chamber used for heating" rather than an entire system including a chamber used for heating. *Id.* at 40. In support of his conclusion, the ALJ pointed to specific passages of the common

[4] Although the term "oven" also occurs in asserted claims 12, 15, and 31-32 of the `614 patent, the ALJ's construction of the term has no effect on his infringement findings with respect to the `614 patent since this patent does not claim using the same oven to heat the anti-stiction compound and contain the wafer. *See* ID at 171-72, 193-95.

[5] Although we summarize aspects of the ID for the convenience of the reader, we rely on the full

specification that he found persuasive. *Id.* at 41 (*citing* JX-1 at 8:6-19, 9:33-39). He further determined that his adopted construction is consistent with the claims of the patents-in-suit and ensures that each of the embodiments shown in Figures 4 and 5 are covered by certain claims in the `614 and `942 patents. *Id.* Thus, he found that claim 1 of the `942 patent, which required the same "oven" for both vaporizing the anti-stiction material and holding the wafers, read on Figure 5 of the common specification. In contrast, he found that claim 12 of the `614 patent, which did not require the same "oven" for both vaporizing the anti-stiction material and holding the wafers, read on Figure 4 of the common specification. Furthermore, he reasoned that when the intrinsic evidence offers an equal choice between a broader or narrower construction, as it did here, the narrower meaning must be chosen. *Id.* (*citing Athletic Alternatives, Inc. v. Prince Mfg., Inc.*, 73 F.3d 1573, 1581 (Fed. Cir. 1996)). While he noted that the `740 patent specification, which is incorporated by reference into the common specification, illustrated and described an "oven" as the entire system, he concluded that the `740 patent specification does not affect the scope of the claimed invention because it is prior art. *Id.* (*citing* `740 patent, Fig. 4, col. 4:56-67).

Based on his construction of "oven," the ALJ concluded that this limitation in claim 1 of the `942 patent was not met by the accused process because the accused process uses an ampoule to vaporize the anti-stiction material that is separate from the chamber holding the wafers to be treated. ID at 223-24.

2. *Parties' arguments*

The IA and Analog Devices submit that the proper construction of the term "oven" is "a system for heating that includes a heated chamber" or "a system that includes a heated chamber,"

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explanation provided by the ID, except as otherwise indicated herein.

respectively. IA's Sub. at 3; Analog Devices' Sub. at 3-6. Referring to Figure 4 of the asserted patents, they contend that the system includes not only the heated chamber, but also other components such as the reservoir, heaters, delivery line, etc. IA's Sub. at 2-3; Analog Devices' Sub. at 3-5 (*citing* `614 patent, Fig. 4). They submit that this construction is consistent with both parties' expert testimony. IA's Sub. at 2-3; Analog Devices' Sub. at 3-5 (*citing* Miller (Complainant's expert), Tr. at 372; Ashurst, Tr. at 619-22). Respondents argue that the common specification refers to all of the system components shown in Figure 4 as a "modified vapor prime oven. IA's Sub. at 2-3; Analog Devices' Sub. at 4-5 (*citing* `614 patent, Fig. 4, cols. 2:12-13, 8:7-9). The IA and Analog Devices further note that Respondents' expert described Figure 4 as showing "one vapor prime oven" with modifications, where these "modifications" are the heaters around the reservoir. IA's Sub. at 2-3; Analog Devices' Sub. at 4 (*citing* Ashurst, Tr. at 619-22).

The IA and Analog Devices submit that the same modified vapor prime oven shown in Figure 4 of the asserted patents is illustrated and discussed in the `740 patent (which is incorporated by reference into the asserted patents), which describes an "oven" comprising a chamber *and other components*, including a vacuum line and a nitrogen line. IA's Sub. at 1-2; Analog Devices' Sub. at 5-6 (*citing* `740 patent, Fig. 4, col. 5:46-48, 56-60) (emphasis added).

Thus, the IA and Analog Devices contend that the "oven" referenced in the claims of the asserted patents includes the entire system shown in Figure 4 of the common specification, and is not limited to the deposition chamber alone. IA's Sub. at 3; Analog Devices' Sub. at 6.

Respondents state that they proposed, and the ALJ adopted, a construction limiting the term "oven" to the heating chamber 1. Respondents' Sub. at 2-4 (*citing* `614 patent, Figure 4).

They submit that the broader construction of "oven" urged by the IA and complainant yields overly broad results that are inconsistent with the specification. *Id.* Respondents explain that the construction of the term "oven" proposed by Analog Devices and the IA must cover the entire heating system shown in Figure 4 of the asserted patents. *Id.* They contend that this "entire system" construction includes the following elements: (1) a reservoir **4**; (2) heaters **6** on the reservoir; (3) a delivery line that connects the reservoir and the deposition chamber; (4) a vacuum valve **2**; (5) an inert gas inlet valve **3**; and (6) a device (such as a computer) for programming the temperature, gas pressure, etc. of the oven. *Id.* (*citing* `614, Figure 4, col. 8:6-19).

Respondents note that the claims recite "inserting a wafer . . . into one of a oven or a furnace." *Id.* at 4-6 (*citing* `942 patent, claim 1). They submit that, if the term "oven" were construed to encompass the entire heating system of Figure 4, then claim 1 of the `942 patent would cover a method in which the wafer is inserted into any portion of the system, including elements such as a heater, delivery line, or a device for programming, *i.e.*, a computer. *Id.* at 4-6. Using the broader construction for the term "oven," Respondents assert that the claims would recite "inserting a wafer . . . into a system that includes a heated chamber." *Id.* Accordingly, they contend, the claim would cover inserting a wafer *into the system itself* – as opposed to inserting a wafer into a chamber within that system, for example. *Id.* (emphasis added). Therefore, Respondents contend that following the broader construction leads to an illogical result. *Id.*

3. *Analysis*

The Commission agrees with the ALJ in selecting the narrower construction for "oven" and adopts his reasoning as set out in the ID at page 38-44, as supplemented and clarified herein. In particular, we supplement the ALJ's analysis of the import of the `740 patent, which was incorporated by reference into the common specification. The issue presented is what bearing the `740 patent, by the manner in which it is incorporated by reference into the common specification, should have in our construction of the term "oven" in the asserted claims.

The `740 is incorporated in column 5 of the common specification as follows: "(FIGS. 1 and 2 are described in further detail in U.S. Pat. No. 5,694,740, which is incorporated herein in its entirety by reference.)"[6] *See* `942 patent, col. 5:45-49. Based on the patentee's choice of language, we believe one of ordinary skill in the art would understand that the `740 patent was invoked here to supply further useful description of Figures 1 and 2 of the common specification. Because Figures 1 and 2 of the asserted patents illustrate typical prior art micromachined devices and make no reference to an "oven" or Figure 4 of the `740 patent, one of ordinary skill would not understand this invocation of the `740 patent as an attempt to provide disclosure as to the meaning of the term "oven" as used in the asserted claims. *Id.* (Figs. 1, 2).

The `740 patent is referred to several other times in the specification, including in columns 1, 6-7, 10, and 16. In each of these instances, it is invoked to contrast or explain problems inhering in the prior art. Because these passages do not address the oven disclosed in the asserted claims, we again conclude that one of ordinary skill would not understand the `740 patent to provide disclosure as to the term "oven" as used in the asserted claims. *Id.*, cols.

[6] Figures 1 and 2 of the common specification are copies of Figures 1 and 2 from the `740 patent.

1:42-51; 6:34 to 7:2; 10:56-60; 16:52-54. Therefore, in our view, the patentee of the `614 and `942 patents is not referencing the `740 patent to define the claimed "oven" of the asserted patents, but rather to describe other distinct subject matter of the asserted patents.

We have also considered the fact that another portion of the `740 patent describes an oven. *See* `740 patent, 4:56-67. In particular, we note that Figure 4 of the `740 patent is similar to Figure 4 of the `614 and `942 patents. *Compare* `740 patent, Figure 4 *with* `614 and `942 patents, Figure 4. There is, however, a highly instructive difference between these two figures: in Figure 4 of the `740 patent, element **100** (the "oven") refers to the figure as a whole, whereas in Figure 4 of the `614 and `942 patents, element **1** (the "Modified Vapor Prime Oven") points to the chamber. *See* `740 patent, Figure 4, col. 4:59; `614 and `942 patents, Figure 4, col. 8:9.

Also, we clarify that we understand the ALJ to have placed little or no weight on *Athletic Alternatives* in his analysis, since he did not view the evidence as presenting an "equal choice" between the broader and narrower construction. *See* ID at 38-42. To the extent that the ID could be construed to rely on *Athletic Alternatives*, we do not. *See Northern Telecom Ltd. v. Samsung Elecs. Co.*, 215 F.3d 1281, 1295 (Fed. Cir. 2000) (explaining that *Athletic Alternatives* applies only when "reasoned analysis leads to two clear and distinct definitions of claim language, *i.e.*, 'two strong and contradictory interpretative strands,'" and is not applied simply because of confusing or ambiguous statements made in the intrinsic record) (citations omitted).

Accordingly, the Commission affirms the ALJ's claim construction of the term "oven" as "a chamber used for heating" and affirms his dependent finding that the accused process does not meet this claim limitation in claim 1 of the `942 patent under his construction.

B. The `614 and `942 patents - claim construction of "sawing" and infringement

We determined to review the ALJ's construction of the claim term "sawing" relating to both asserted patents, and his determination that the accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent. ID at 29-33, 262.

1. *Initial Determination*

The term "sawing" appears in all asserted claims (*i.e.*, claims 12, 15, 31-32, 34-35, and 38-39) of the `614 patent and asserted claim 1 of the `942 patent. Representative claim 1 of the `942 patent recites, in relevant part, "*sawing* said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound[.]" `942 patent, col. 18:7-9 (emphasis added).

Relying on the intrinsic record, the ALJ construed "sawing" as "cutting," where such cutting may be performed by any means (*e.g.*, mechanical blade, laser saw, or other means) because he found that neither the specification nor the prosecution history limited the means that could be used. ID at 29-33 (*citing* `614 patent, col. 1:61-64; col. 6:1-2, col. 7:46-48, col. 9:15-16, 28-32; JX-3 at ANALOG00006452). Despite his broad construction, he found that this limitation was not met by the accused process. ID at 170-75, 197-98. Relying on record evidence, he found that the accused process uses a two-step [[ ]] process [[ ]]. ID at 172-75, 197-98. [[

]]

[[

]].

Further, he found that this distinct method of separating the wafer used by the accused process is not infringement under the doctrine of equivalents. *Id.* While acknowledging that the accused process achieves substantially the same result as "sawing," he found that the [[

]] process does not perform substantially the same function in substantially the same way. *Id.* He concluded that the dicing process does not separate the wafer into a plurality of portions by "cutting," but rather achieves the same result by [[

]].

2. *Parties' arguments*

In their petitions for review, the IA and Analog Devices both submit that the ALJ correctly construed the term "sawing," but erroneously required "sawing" to be a single-step procedure because there is no support in the evidentiary record for such a reading. IA's Pet. at 9-12 (fn. 3); Analog Devices' Pet. at 13-16. In their response, Respondents contend that the testimonial evidence establishes that the [[ ]] process describes two separate procedures, neither of which is sufficient to fragment the subject wafer and therefore cannot be considered

"cutting." Respondents' Resp. at 24-27 (*citing* Cech, Tr. at 143-44, RX-210C (Loeppert) at Q. 22).

3. *Analysis*

The Commission agrees with the ALJ's construction of the term "sawing" as "cutting." Also, the Commission agrees that this limitation is not met by the accused process and supplements his reasoning. While affirming the ALJ, we do not do so on the basis that the accused process involves two steps, but rather because nothing in the evidentiary record indicates that the accused [[ ]] process [[ ]] to separate a wafer involves "cutting." [[ ]] product documentation, consistent with the testimonial evidence, refers solely to heating the wafer by laser means (*i.e.*, laser irradiation), and then "separating," rather than "cutting," the wafer using tape expansion. *See* JX-28C at 59621; Cech, Tr. at 143-44; RX-210C at Q. 22; Ashurst, Tr. at 754. The Commission agrees that neither of these steps, or both of them collectively, involve "cutting." Moreover, claim 2 of the `942 patent recites "separating," rather than "sawing" as recited in claim 1, and therefore the doctrine of claim differentiation presumes that these two terms have distinct meanings. *See* `942 patent, col. 18:7-8, 20-21; *Nystrom v. Trex Co.*, 424 F.3d 1136, 1143 (Fed. Cir. 2005) ("When different words or phrases are used in separate claims, a difference in meaning is presumed.").[7]

Accordingly, the Commission affirms the ALJ's claim construction of the term "sawing" and affirms his finding that the accused process does not meet this limitation, either literally or under the doctrine of equivalents.

[7] While claim differentiation is a canon of claim construction, and the construction of the term "sawing" is not disputed by the parties, the concept is still instructive in determining whether the accused process infringes the asserted claims. Put differently, if a term in another claim is broader than a term in a claim at issue, a process that infringes the broader term may not infringe

C. The `767 patent – anticipation

We reviewed the ALJ's finding that the `767 patent does not incorporate by reference the `454 and `374 patents.

1. *Relevant prior art and incorporation by reference*

The `767 patent teaches a method of separating a wafer into a die whereby there is at least one-wafer level process performed prior to separation. `767 patent, col. 1:45-62. An example of a wafer-level processing step is "passivation," which the `767 patent explains is a process that "prevents or cures sticking between contacting surfaces[.]" *Id.* at col. 4:30-33. The `767 patent purports to incorporate by reference, as discussed *infra*, two patents – U.S. Patent No. 5,331,454 ("the `454 patent) and U.S. Patent No. 5,512,374 ("the `374 patent") – that disclose examples of anti-stiction passivation processing. *Id.* at col. 5:25-31. The `454 patent discloses applying an anti-stiction treatment after dividing the wafer into chips. RX-25 (`454 patent, col. 3:9-13). The `374 patent discloses applying an anti-stiction coating to micro-mechanical devices at the wafer level as a vapor, either by vapor deposition techniques at low pressure or by thermal evaporative techniques. RX-15 (the `374 patent) at col. 2:51-55, col. 5:37-41, 48-53.

2. *Initial Determination*

Respondents contended that asserted claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent, and claims 1-6 and 8 of the `942 patent, are anticipated by the `767 patent, which purports to incorporate by reference the `454 and `374 patents. Respondents offered into evidence only the `767, `454, and `374 patents. The passage in the `767 patent incorporating the two patent references, however, reads:

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the narrower term.

> Examples of wafer-level passivation process [sic] are described in *U.S. patent application* Ser. No. 08/239,497, entitled 'PFPE Coatings for Micromechanical Devices', and in *U.S. patent application* Ser. No. *5,331,454*, entitled 'Low Reset Voltage Process for DMD', each assigned to Texas Instruments Incorporated, and each incorporated herein by reference.

RX-20 (`767 patent) at col. 5:25-31 (emphasis added). U.S. Patent Application Ser. No. 08/239,497, referenced in the passage, matured into the `374 patent. It is undisputed that the reference to "U.S. Patent Application Ser. No. 5,331,454" was a typographical mistake by the U.S. Patent & Trademark Office ("PTO"), and should have referred to "U.S. Patent No. 5,331,454," as stated in the original application leading to the `767 patent. *See* Respondents' Pet. at 19, Exh. E at p. 12 (application and prosecution history for the `767 patent).

The ALJ found that "[t]o incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents." ID at 86-89 (*citing Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000); *In Re Seversky*, 474 F.2d 671, 674 (C.C.P.A. 1973) (explaining that incorporation by reference requires a statement "clearly identifying the subject matter which is incorporated and where it is to be found.")).

Regarding the `374 patent, the ALJ found that the patent actually incorporates by reference U.S. Patent Application Ser. No. 08/239,497 ("the `497 application"), which is the patent application that led to the `374 patent. Accordingly, the ALJ found that the `767 patent does not incorporate by reference the `374 patent and that Respondents did not explain why they did not use the `497 application or offer it into evidence for their invalidity argument. *Id.* (*citing CIF Licensing, LLC v. Agere Sys., Inc.*, 2010 WL 3001775, at *18-19 (D. Del. Jul. 30, 2010) (holding that the patent application, and not the patent, was incorporated by reference, and

that the alleged infringer could not rely on the patent for its anticipation argument)). The ALJ found that Respondents' expert witness (Dr. Ashurst) offered only equivocal and conclusory testimony that the `497 application has the same disclosure verbatim as the `374 patent. ID at 88 (*citing* Tr. at 640) (Ashurst testifying that it was his "understanding that the application referenced was the verbatim the text of the `374 patent."). The ALJ also stated "[I]mportantly, there is no indication from Dr. Ashurst that he personally examined both the `374 patent and `497 application and confirmed that they contain the same disclosure." *Id.* Based on the foregoing, he concluded that the `374 patent was not properly incorporated by evidence into the `767 patent. *Id.*

Similarly, the ALJ found that the `454 patent was not properly incorporated into the `767 patent. He noted that the `767 patent specifically incorporates by reference "U.S. patent application Ser. No. 5,331,454," instead of U.S. Patent No. 5,331,454. *Id.* Although it was undisputed that this was a typographical error by the PTO, the ALJ found that the passage in question does not clearly indicate what material is incorporated with "detailed particularity." *Id.* (*citing Advanced Display*, 212 F.3d at 1282). Also, he concluded that an unambiguous inference of what the patentee intended to identify could not be made since the inventor could be referring to either the patent or the patent application leading to the patent. *Id.*

3. *Parties' arguments*

In their petition for review, Respondents contend that the important focus is the *material* or *content* that is incorporated by reference, rather than the title or label applied to the material. Respondents' Pet. at 14-19 (emphasis added) (*citing Advanced Display*, 212 F.3d at 1282 (Fed. Cir. 2000) (emphasis added); Manual of Patent Examining Procedure ("MPEP"), §§ 608.01(p);

2163.07(b)). Also, they contend that incorporation by reference is proper when the information being incorporated and where it may be found are identified. *Id.* (*citing Callaway Golf v. Acushnet Co.*, 575 F.3d 1331, 1345-46 (Fed. Cir. 2009)).

Respondents argue that the ALJ committed errors of fact and law in finding that there was no proper incorporation by reference of the `374 patent. They point out that Dr. Ashurst testified categorically in his direct testimony that the "issued `374 patent is verbatim identical to the application [cited] in the host patent." Respondents' Pet. at 16 (*citing* Ashurst Direct, RX-203C, Qs. 238, 303, and 353). They maintain that the ALJ is in error when he states that "there is no indication from Dr. Ashurst that he personally examined both the `374 patent and `497 application and confirmed that they contain the same disclosure." Respondents' Pet. at 15-17 (*citing* ID at 88). Respondents point to Dr. Ashurst's Expert Report, which is in evidence:

> In addition, the `767 Patent incorporates by reference U.S. Patent Application Serial No. 08/239, 497, entitled 'PFPE Coatings for Micromechanical Devices'. This Application resulted in U.S. Patent No. 5,512,374, the text of which is verbatim identical to the application. For convenience, I will cite from the `374 patent, although, to be clear, it is the patent application that is incorporated by reference.

Id. (*citing* RX-47C, p. 21). In this passage Dr. Ashurst gave his reason (*i.e.*, convenience) for citing to the patent rather than the application. Moreover, Respondents submit that Dr. Ashurst expressly states in his report that he considered all material referenced in this report. *Id.* (*citing* RX-47C, Ex. B).

Respondents acknowledge that on cross examination, Dr. Ashurst testified "it's my understanding. . . ." However, they point out that the question posed to Dr. Ashurst on cross examination elicited a response as to his understanding, *citing* Tr. at 640: 4-14:

Q. "You understand, just for the record, you understand that refers to the Wallace patent that we talked about yesterday?

A. It's my understanding that the application referenced there was verbatim the text of the `374 patent.

As for *CIF Licensing*, cited by the ALJ, Respondents point out that the judge in that case specifically states and stressed that "no evidence was presented to demonstrate that the issued `227 patent, in relevant part, is the same as the `200 application." Respondents' Pet. at 17. Respondents argue that here they presented "a plethora of evidence that the issued `374 patent, in relevant part, is the same as the `497 application," and note that no contrary evidence was offered by the IA or Analog Devices. *Id.*

In response, the IA and Analog Devices essentially support the ID for the reasons given in the ID. They contend that the ALJ correctly found that Respondents failed to offer the `497 patent application into evidence or offer any clear evidence that the `497 application has verbatim the same disclosure as the `374 patent. IA's Resp. at 26-28; Analog Devices' Resp. at 16-17. They also support his determination that the `454 patent was not properly incorporated by reference. *Id.*

4. *Analysis*

The Commission agrees with Respondents that the information disclosed in the `374 and `454 patents is adequately incorporated by reference into the `767 patent because, when considering incorporation by reference, the proper focus is on material and content rather than semantics and typographical errors. *See Advanced Display*, 212 F.3d at 1283. Specifically, to be incorporated by reference, the passage need only "identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found." *Id.* at 1282.

The passage in question of the `767 patent expressly uses the term "incorporate herein by reference" to trigger incorporation of the specific material and content (*i.e.*, exemplary anti-stiction wafer-level passivation processes) located in the identified reference, namely the `497 patent application (leading to the `374 patent) and the `454 patent.

Unlike *CIF Licensing*, Respondents here provided evidence that the `374 patent disclosure is the same as the `497 patent application that was incorporated by reference. Specifically, Respondents' expert testified and stated in his expert report that the `497 application is verbatim the text of the `374 patent. *See* Ashurst, Tr. at 640; RX-47C at p. 21; RX-203 at Q. 238, 303, 353; Ashurst, Tr. at 640. We disagree with the ALJ's finding that Dr. Ashurst's testimony was equivocal based on his answer to a single question on cross-examination.

In our view, Respondents' evidence establishes that there is a one-to-one correspondence between the issued `374 patent and the `497 patent application, so that when a particular passage of the patent is referenced (*i.e.*, a passage referring to vapor deposition at low pressure), then that same passage may be found in the application. We also note that Analog Devices has not shown any evidence of differences between the '497 application and the `374 patent, much less differences that are relevant to Respondents' invalidity arguments. Further, we note that in customary patent practice before the PTO, the specification of the filed patent application is identical to that of the issued patent except for any amendment to the claims or minor corrections to the specification. In fact, a substantial addition to the application's specification during prosecution would be rejected as new matter. *See* 35 U.S.C. § 132; MPEP § 706.03(o).

Accordingly, in our view, Respondents have provided sufficient support for the Commission to consider the disclosures in the issued patent `374 patent to be identical to the disclosures in the patent application that was incorporated by reference.

Regarding the incorporation of the `454 patent, we believe that it would be clear to one of ordinary skill in the art that "U.S. patent application Ser. No. 5,331,454," refers to U.S. Patent No. 5,331,454, rather than to any application. Patent applications are designated by series and always include the distinctive "/" symbol to separate the series number from the application number (*e.g.*, U.S. Patent Application Ser. No. 10/457,500, which led to the asserted `614 patent). *See* `614 patent. Moreover, the file history of the `767 patent substantiates Respondents' claim that the PTO erred in designating the reference. *See* Ex. E to Respondents' Pet. Therefore, in view of this error and consistent with both parties' expert testimony,[8] the Commission finds that one reasonably skilled in the art would interpret the incorporated reference as the `454 patent. Moreover, when read in full, the incorporation passage in the `767 patent refers to anti-stiction passivation processing at both the die (chip) or wafer level. *See* `767 patent, col. 5:18-31. Therefore, the `454 patent includes the specific material and content for proper incorporation because the `454 patent discloses anti-stiction passivation processing at the chip level. *See* `454 patent, col. 2:67 to col. 3:1-24.

Based on the above, the Commission reverses the ALJ's conclusion and determines that the `767 patent incorporates by reference the disclosures of both the `374 and `454 patents.

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[8] *See* Ashurst, Tr. at 640 (Q. "And the other example identified there is a patent to Hornbeck, right, the one that is titled `454. You understand to be a patent to Hornbeck?" A. "I believe so, yes."); Miller, Tr. at 839-40 (Q. "Okay. And among the other prior art that RX-20, the `767 patent refers to, is the `454 patent, correct?" A. "I agree.").

D. Anticipation

Despite finding that the `767 patent did not incorporate by reference the `374 and `454 patents, the ALJ supplied an alternative anticipation analysis assuming, *arguendo*, that it did. *See* ID at 89-90, 100-110. On review, we have considered challenges to the ALJ's alternative analysis and determine to adopt his analysis as our own, without further elaboration. Thus, we affirm the ALJ's conclusion that claims 34-35 and 38-39 of the `614 patent and claims 2-6 and 8 of the `942 patent are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent.

E. Obviousness

Respondents asserted that claims 34-35 and 38-39 of the `614 patent were obvious in view of the `767 patent and Sakata. Based on his construction of "sawing," the ALJ found that the combination of the `767 patent and Sakata does not disclose this limitation because the `767 patent (similar to the accused process) discloses a two-step process of laser inscribing the wafer with separation lines, and then applying pressure to break the wafer into dies along the separation lines. ID at 134-38 (*citing* RX-20 (`767 patent) at 1:18-26, 3: 40-62, 4:44-67). The ALJ concluded that this two-step process is not "cutting," especially because he found that the `767 patent teaches away from sawing because it is a "wet" process leading to debris that can contaminate the die.

We find that the combination of the `767 patent and Sakata does not teach the "sawing" limitation of the asserted claims of the `614 patent, for the same reasons as the accused [[

]] process (which is a similar two-step process) does not infringe the asserted claims of

the `614 patent. Therefore, we affirm the ALJ's conclusion that the asserted claims of the `614 patent are not obvious in view of the `767 patent and Sakata.

F. Domestic Industry – Technical Prong

Based on the evidentiary record, the ALJ found that Analog Devices satisfies the technical prong of the domestic industry requirement under 19 U.S.C. § 1337(a)(2)-(3) with respect to both asserted patents by practicing claim 12 of the `614 patent and claim 1 of the `942 patent. ID at 245-49, 251-52. Respondents argued that Analog Devices could not meet the domestic industry requirement because at least one claim step of each of these claims was not performed in the United States. The ALJ found this argument waived under his Ground Rule 8.2 because Respondents failed to raise the issue with particularity in their pre-hearing brief. ID at 245. Nonetheless, he considered and rejected Respondents' argument on the merits in his analysis of the domestic industry issue.

We affirm the ALJ's conclusion that Respondents waived the argument that Analog Devices could not meet the technical prong of the domestic industry requirement by practicing at least one step of the claims outside the United States[9] and therefore affirm the ALJ's conclusion that Analog Devices satisfies the technical prong of the domestic industry requirement. We take no position on the ALJ's reasoning on the merits of Respondents' argument.

G. Conclusion

Based on the conclusions above (and those of the ALJ, which we adopt to the extent they are not inconsistent with our conclusions above), we find a violation of section 337 with respect to claims 2-6 and 8 of the `942 patent.

IV. REMEDY, PUBLIC INTEREST, AND BONDING

For the reasons set forth below, the Commission has determined to adopt the ALJ's recommended determination ("RD") on remedy and bonding. *See* ID at 252-61. Also, we have determined that the public interest does not preclude the ALJ's recommended remedy. We focus our discussion on the remedy and bonding issues in dispute.

The Commission is authorized to issue a limited exclusion order when the Commission determines that there is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337). The ALJ recommended that, if the Commission were to determine that there has been a violation of section 337, a limited exclusion order should issue that is directed to Knowles and Mouser, as well as all of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, and that covers "the MEMS devices and products containing the same found to infringe the asserted patents." *Id.*

The ALJ noted that Knowles performs three alternative anti-stiction processes to make its SiSonic products that were not accused by Analog Devices and therefore are not part of the investigation. *Id.* These three anti-stiction process include the following: (1) a wet-SAM ("self-assembled monolayer) process; (2) a vapor process depositing anti-stiction coating on individual die; and (3) a vapor process depositing anti-stiction coating on packaged parts. *Id.* Accordingly, in light of these non-accused processes, the ALJ recommended that any exclusion order include a certification provision which allows Respondents to import non-infringing SiSonic products by providing the U.S. Customs and Border Protection ("Customs") with a written certification that the imported products are outside the scope of an exclusion order. *Id.*

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[9] Chairman Okun does not join in this conclusion.

(*citing Certain Semiconductor Chips With Minimized Chip Package Size & Products Containing Same*, Inv. No. 337-TA-605, Comm'n Op. (July 29, 2009)).

Further, the ALJ found that cease and desist orders were not warranted. *Id.* at 257. Analog Devices did not seek a cease and desist order directed against Knowles since 100% of Knowles' current U.S. inventory comprises SiSonic products made using the non-accused process. *See* Respondents' Post-Hearing Br. at 136 (*citing* Loeppert, Tr. at 428). Although Mouser stipulated to maintaining an inventory as high as [[ ]] at its facility in Texas, the ALJ found that this evidence did not show that Mouser maintained a "commercially significant" inventory of SiSonic products made using the accused, infringing process rather than the non-accused processes. *Id.* (*citing Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, USITC Pub. 2391, Comm'n Op. at 37-42 (June 1991)).

The RD recommended no bond, should the Commission find a violation, because the ALJ found that Analog Devices did not establish any need for a bond. *Id.* at 260-61. The ALJ found that, although Knowles and Mouser both stipulated to the price of their SiSonic products in detailed form, Analog Devices failed to perform a price differential analysis between Respondents' and complainant's SiSonic products. *Id.* (*citing* JX-49C at ¶¶ 19-22). Accordingly, the ALJ found that Analog Devices did not meet its burden to demonstrate the proper bond amount. *Id.* (*citing Certain Rubber Antidegradants, Components Thereof, and Products Containing Same ("Rubber Antidegradants")*, Inv. No. 337-TA-533, Comm'n Op. at 39-40 (July 21, 2006) (holding that it is the complainant's burden to establish the need for a bond amount in the first place).

A. Remedy

The Commission agrees with the ALJ that the appropriate relief includes a limited exclusion order directed to all of Knowles' and Mouser's MEMS devices and products containing same that are manufactured abroad or imported by or on behalf of Knowles or Mouser, or any of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns. We also agree with the ALJ that complainant has not provided specific evidence that Mouser maintains a "commercially significant" inventory of accused, infringing SiSonic MEMS products to warrant issuance of a cease and desist order. The stipulation document (JX-49C) the IA and complainant rely on expressly refers to [[

]].

Accordingly, there is no way to determine, from this one piece of evidence, if there is a "commercially significant" inventory of MEMS devices made using the accused process exclusively that would warrant issuance of a cease and desist order.

Further, we agree with Respondents and the IA that any exclusion order should include a certification provision allowing importation of Respondents' MEMS devices and products containing the same that are made using the non-accused anti-stiction processes. We view such a certification provision as addressing Respondents' concerns regarding possible exclusion of any of their MEMS devices made using the non-accused processes. Moreover, unlike the cases cited by Respondents, an express carve-out is not warranted in this case where complainant has not filed any motion to terminate the investigation as to specified products (or to exclude these products from the scope of any limited exclusion order), and the ALJ denied Respondents'

summary determination motion of non-infringement with respect to the non-accused processes. *See* Order No. 8 (July 12, 2010).

B. Public interest

When issuing an exclusion order under section 337(d), the Commission must weigh the remedy sought against the effect such a remedy would have on the following public interest factors: (1) the public health and welfare; (2) the competitive conditions in the United States economy; (3) the production of articles in the United States that are like or directly competitive with those subject to the investigation; and (4) United States consumers. *See* 19 U.S.C. § 1337(d)(1).

Respondents argue, under the rubric of "public interest," that an exclusion order should carve out products made by its "die level" process and should include a certification provision. Failure to do so, they assert, would stifle U.S. technology companies from evaluating and advancing future product designs. In particular, they argue, inability to import samples of non-infringing MEMS products for qualification would force downstream users to either continue using current MEMS models or to focus any new qualification activities on Analog's products. The alleged result would be harm to the U.S. economy either by delaying new product development for popular consumer products or reducing competition. Respondents' Sub. At 25-26.

Analog Devices states that Respondents have not established non-infringement for products made with Knowles' "die level" process. Analog Devices' Reply at 15. More generally, Analog Devices and the IA state that there is no evidence that demand for MEMS devices cannot be met by Analog and other manufacturers, and that these devices are not the

types that raise any particular public interest concerns. Analog Devices' Reply at 15; IA's Sub. at 15-16. The IA also states that there is no evidence that an exclusion order would hurt the U.S. electronics market, including leading edge smartphone and tablet technology. IA's Reply at 4-5.

The Commission finds that the exclusion order would not be contrary to the public interest. U.S. demand for MEMS devices and products containing the same can be met by other entities, including Analog Devices. Moreover, the certification provision discussed above will allow importation of non-infringing devices.

C. Bonding

Section 337(j) provides for entry of infringing articles during the sixty (60) day period of Presidential review upon posting of a bond and states that the bond is to be set at a level "sufficient to protect the complainant from any injury." 19 U.S.C. § 1337(j)(3); *see also* 19 C.F.R. § 210.50(a)(3).

The Commission agrees with the ALJ and Respondents that Analog Devices has the burden of attempting to perform a "meaningful price comparison" in order to establish a basis for a 100% bond. However, Analog Devices has failed to present any pertinent evidence of even attempting to compare its pricing with that of Respondents, and therefore has not shown that calculating a price differential is too difficult to perform. *See Silicone Microphone Packages I*, ID at 222 (January 12, 2009); *Certain Liquid Crystal Display Devices and Products Containing the Same ("LCD Devices")*, Inv. No. 337-TA-631, Comm'n Op. at 27-28 (July 14, 2009). Complainant cites a single, one-sentence reference, but fails to provide any information concerning the price for specific product models or whether the price range provided therein

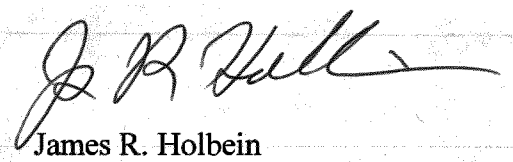
refers to list prices or actual sale prices. *See* CX-156C at Q. 102. Accordingly, consistent with *Rubber Antidegradants*, *Silicone Microphone Packages I*, and *LCD Devices*, we believe that Analog Devices has failed to meet its burden to establish that any bond is appropriate. Therefore, we determine that no bond should be imposed during the period of Presidential review.

V. CONCLUSION

The Commission has determined that there has been a violation of section 337, and has further determined that the appropriate form of relief is a limited exclusion order prohibiting the unlicensed entry of MEMS devices and products containing the same that infringe claims 2-6 and 8 of the '942 patent, that are manufactured abroad or imported by or on behalf of Knowles or Mouser, or any of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns.

The Commission further has determined that the public interest factors enumerated in section 337(d)(1) (19 U.S.C. § 1337(d)(1)) do not preclude issuance of the limited exclusion order. Finally, the Commission determined that there should be no bond during the period of Presidential review.

By order of the Commission.



James R. Holbein
Acting Secretary to the Commission

Issued: May 13, 2011

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME **337-TA-700**

CERTIFICATE OF SERVICE

I, James R. Holbein, hereby certify that the attached **COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Kecia J. Reynolds, Esq., and the following parties as indicated, on **March 13, 2011**.

James R. Holbein, Acting Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

On Behalf of Complainant Analog Devices, Inc.:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, L.L.P.
1200 Seventeenth Street, NW
Washington, DC 20036

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

On Behalf of Respondents Knowles Electronics LLC and Mouser Electronics, Inc.:

Sturgis M. Sobin, Esq.
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, NW
Washington, DC 20004-2401

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME **337-TA-700**

PUBLIC MAILING LIST

Heather Hall
LEXIS-NEXIS
9443 Springboro Pike
Miamisburg, OH 45342

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

Kenneth Clair
THOMSON WEST
1100 13th Street, NW Suite 200
Washington, DC 20005

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME **337-TA-700**

CORRECTED CERTIFICATE OF SERVICE

I, James R. Holbein, hereby certify that the attached **COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Kecia J. Reynolds, Esq., and the following parties as indicated, on **May 13, 2011**.

James R. Holbein, Acting Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

On Behalf of Complainant Analog Devices, Inc.:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, L.L.P.
1200 Seventeenth Street, NW
Washington, DC 20036

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Kenneth Clair
THOMSON WEST
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( ) Via Hand Delivery
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( ) Other: _____

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of **CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING SAME**	**Investigation No. 337-TA-700**

NOTICE OF COMMISSION DECISION TO REVIEW-IN-PART A FINAL INITIAL DETERMINATION FINDING A VIOLATION OF SECTION 337; REQUEST FOR WRITTEN SUBMISSIONS REGARDING REMEDY, BONDING, AND THE PUBLIC INTEREST

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review-in-part a final initial determination ("ID") of the presiding administrative law judge ("ALJ") finding a violation of section 337 in the above-captioned investigation, and is requesting written submissions regarding remedy, bonding, and the public interest.

FOR FURTHER INFORMATION CONTACT: Clint Gerdine, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-2310. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on December 31, 2009, based on a complaint filed on December 1, 2009, by Analog Devices, Inc. ("Analog Devices") of Norwood, Massachusetts. 75 *Fed. Reg.* 449-50 (Jan. 5, 2010). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain microelectromechanical systems ("MEMS") devices and products containing the same by reason of infringement of certain claims of U.S. Patent Nos. 7,220,614 ("the `614 patent") and 7,364,942 ("the `942 patent"). The

complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337. The complaint named as respondents Knowles Electronics LLC of Itasca, Illinois and Mouser Electronics, Inc. of Mansfield, Texas.

On December 23, 2010, the ALJ issued his final ID finding a violation of section 337 by respondents with respect to the `942 patent, and which also included his recommendation on remedy and bonding during the period of Presidential review. The ALJ found no section 337 violation with respect to the `614 patent due to non-infringement of the asserted claims. On January 21, 2011, the Commission issued notice of its determination to extend the deadline to March 7, 2001, for determining whether to review the final ID. On January 18, 2011, Analog Devices, respondents, and the Commission investigative attorney ("IA") filed petitions for review of the final ID, and each party filed responses to the other parties' petitions on January 26, 2011. On February 4, 2011, Analog Devices and respondents each filed submissions on the public interest.

Upon considering the parties' filings, the Commission has determined to review-in-part the ID. Specifically, the Commission has determined to review: (1) the ALJ's construction of the claim term "oven" relating to both the `614 and `942 patents; (2) the ALJ's construction of the claim term "sawing" relating to both the `614 and `942 patents; (3) the ALJ's determination that the accused process does not infringe, either literally or under the doctrine of equivalents, claims 12, 15, 31-32, 34-35, and 38-39 of the `614 patent or claim 1 of the `942 patent; (4) the ALJ's finding that U.S. Patent No. 5,597,767 ("the `767 patent") does not incorporate by reference U.S. Patent Nos. 5,331,454 and 5,512,374 ("the `374 patent"); (5) the ALJ's finding that claims 2-6 and 8 are infringed by the accused process; (6) the ALJ's findings that claims 34-35 and 38-39 of the `614 patent, and claims 2-6 and 8 of the `942 patent, are not anticipated, under 35 U.S.C. § 102(a), by the `767 patent or the `374 patent; (7) the ALJ's findings that claims 34-35 and 38-39 of the '614 patent are not obvious, under 35 U.S.C. § 103, in view of the `767 patent and the Sakata et al. prior art reference; and (8) the ALJ's finding that the technical prong of the domestic industry requirement has been satisfied as to both the `614 and `942 patents. The Commission has determined not to review the remainder of the ID.

On review, with respect to violation, the parties are requested to submit briefing limited to the following issues:

(1) In arguing that the term "oven" should be construed as "a system that includes a heated chamber," is it the contention of Complainant and the IA that the system includes elements such as a reservoir, heaters on the reservoir, a delivery line that connects the reservoir and the deposition chamber, a vacuum line, a nitrogen line, and a device (such as a computer) for programming the temperature, gas pressure, etc. of the oven? *See* Complainant Analog's Contingent Petition at 25 and the IA's Contingent Petition at 6.

(2) If the term "oven" as it appears in claim 1 of the '942 was construed broadly to encompass the entire system, would the claim cover a method

in which the wafer is inserted into, and the anti-stiction compound is heated within, any portion of the system, including the elements listed in the question above, such as a heater, delivery line, or a device for programming? In your response, please address whether the Commission should construe the disputed term in light of the context supplied by the claim, which indicates, for example, that the anti-stiction compound is *heated* within said oven.

(3) If the term "oven" is construed broadly, then is the claim invalid based on a failure to satisfy the written description and enablement requirements? For example, does the specification disclose that the anti-stiction compound can be heated within a vacuum line or a device for programming?

(4) The ALJ determined that the '374 patent did not disclose the limitation "exposing said wafer, substantially at room temperature, to the vapor of a compound having anti-stiction properties" of claim 34 of the '614 patent, finding that a table found at column 5 of the '374 does not disclose a "process whereby the anti-stiction compound is deposited on a wafer 'substantially at room temperature.'" ID at 108-09. Can the required disclosure be found in the '374 at cols. 4:59-5:62?

In addressing these issues, the parties are requested to make specific reference to the evidentiary record and to cite relevant authority.

In connection with the final disposition of this investigation, the Commission may issue an order that results in the exclusion of the subject articles from entry into the United States. Accordingly, the Commission is interested in receiving written submissions that address the form of remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or likely to do so. For background, *see In the Matter of Certain Devices for Connecting Computers via Telephone Lines*, Inv. No. 337-TA-360, USITC Pub. No. 2843 (December 1994) (Commission Opinion).

When the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest factors in the context of this investigation, particularly in the context of the ALJ's recommendations on remedy.

When the Commission orders some form of remedy, the U.S. Trade Representative, as

delegated by the President, has 60 days to approve or disapprove the Commission's action. *See* section 337(j), 19 U.S.C. § 1337(j) and the Presidential Memorandum of July 21, 2005, 70 *Fed. Reg.* 43251 (July 26, 2005). During this period, the subject articles would be entitled to enter the United States under bond, in an amount determined by the Commission. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed if a remedy is ordered.

WRITTEN SUBMISSIONS: The parties to the investigation are requested to file written submissions on the issues under review in response to the above-referenced questions. The submissions should be concise and thoroughly referenced to the record in this investigation. Parties to the investigation, interested government agencies, and any other interested parties are encouraged to file written submissions on the issues of remedy, the public interest, and bonding, and such submissions should address the recommended determination by the ALJ on remedy and bonding. The complainant and the Commission investigative attorney are also requested to submit proposed remedial orders for the Commission's consideration. Complainant is also requested to state the dates that the patents at issue expire and the HTSUS numbers under which the accused articles are imported. The written submissions and proposed remedial orders must be filed no later than close of business on March 18, 2011. Reply submissions must be filed no later than the close of business on March 25, 2011. No further submissions on these issues will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must file the original document and 12 true copies thereof on or before the deadlines stated above with the Office of the Secretary. Any person desiring to submit a document to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. *See* 19 C.F.R. §210.6. Documents for which confidential treatment by the Commission is sought will be treated accordingly. All nonconfidential written submissions will be available for public inspection at the Office of the Secretary.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, and in sections 210.42-46 of the Commission's Rules of Practice and Procedure, 19 C.F.R. §§ 210.42-46.

By order of the Commission.

James R. Holbein
Acting Secretary to the Commission

Issued: March 7, 2011

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME **337-TA-700**

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **NOTICE OF COMMISSION DECISION TO REVIEW-IN-PART A FINAL INITIAL DETERMINATION FINDING A VIOLATION OF SECTION 337; REQUEST FOR WRITTEN SUBMISSIONS REGARDING REMEDY, BONDING, AND THE PUBLIC INTEREST** has been served by hand upon the Commission Investigative Attorney, Kecia J. Reynolds, Esq., and the following parties as indicated, on March 7, 2011.

James R. Holbein, Acting Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

On Behalf of Complainant Analog Devices, Inc.:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, L.L.P.
1200 Seventeenth Street, NW
Washington, DC 20036

( ) Via Hand Delivery
(X) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

On Behalf of Respondents Knowles Electronics LLC and Mouser Electronics, Inc.:

Allan J. Sternstein, Esq.
DYKEMA GOSSETT PLLC
Ten South Wacker Drive, Suite 2300
Chicago, Illinois 60606 7453

( ) Via Hand Delivery
(X) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN MEMS DEVICES & PRODUCTS CONTAINING THE SAME	**Inv. Nos. 337-TA-700**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Robert K. Rogers, Jr.

(December 23, 2010)

Appearances:

For Complainant Analog Devices, Inc.:

Tom M. Schaumberg, Esq.; Sarah Hamblin, Esq.; Jonathan J. Engler, Esq.; Deborah S. Strauss, Esq. of Adduci, Mastriani & Schaumberg, LLP, Washington, DC

Steven M. Bauer, Esq.; Justin J. Daniels, Esq.; Colin G. Cabral, Esq. of Proskauer Rose, LLP, Boston, Massachusetts

For Respondent Knowles Electronics LLC:

Allan J. Sternstein, Esq.; Timothy K. Sendek, Esq. of Dykema Gossett PLLC, Chicago, Illinois

Neal Massand, Esq. of Dykema Gossett PLLC, Dallas, Texas

Allan Gabriel, Esq. of Dykema Gossett PLLC, Los Angeles, California

Lyle Vander Schaff, Esq.; Jay H. Reiziss, Esq. of Brinks Hofer Gilson & Lione LLP, Washington, DC

For Respondent Mouser Electronics Inc.:

Guy V. Manning, Esq. of Offices of Guy V. Manning, Forth Worth, Texas

For the Commission Investigative Staff:

Lynn I. Levine, Esq., Director; Thomas S. Fusco, Esq., Supervisory Attorney; Kecia J. Reynolds, Esq., Investigative Attorney; of the Office of Unfair Import Investigations, U.S. International Trade Commission, of Washington, DC

TABLE OF CONTENTS

Pursuant to the Notice of Investigation and Rule 210.42 of the Rules of Practice and Procedure of the United States International Trade Commission, this is the Administrative Law Judge's Final Initial Determination in the matter of Certain MEMS Devices & Products Containing the Same, Investigation No. 337-TA-700.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain MEMS devices and products containing the same, in connection with U.S. Patent No. 7,220,614. Furthermore, the Administrative Law Judge hereby determines that a domestic industry in the United States exists that practices U.S. Patent No. 7,220,614.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain MEMS devices and products containing the same, in connection with U.S. Patent No. 7,364,942. Furthermore, the Administrative Law Judge hereby determines that a domestic industry in the United States exists that practices U.S. Patent No. 7,364,942.

The following abbreviations may be used in this Initial Determination:

CDX	Complainant's demonstrative exhibit
CIB	Complainant's initial post-hearing brief
CPX	Complainant's physical exhibit
CRB	Complainant's reply post-hearing brief
CX	Complainant's exhibit
Dep.	Deposition
JSRCC	Joint Statement Regarding Claim Construction
JSCI	Joint Stipulation of Contested Issues
JX	Joint Exhibit
RDX	Respondents' demonstrative exhibit
RIB	Respondents' initial post-hearing brief
RPX	Respondents' physical exhibit
RRB	Respondents' reply post-hearing brief
RX	Respondents' exhibit
SIB	Staff's initial post-hearing brief
SRB	Staff's reply post-hearing brief
Tr.	Transcript
CPHB	Complainants' pre-hearing brief
RPHB	Respondents' pre-hearing brief
SPHB	Staff's pre-hearing brief

I. BACKGROUND

A. Procedural History

On December 31, 2009, the Commission issued a Notice of Investigation in this matter to determine:

> [W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of MEMS devices and products containing the same that infringe one or more of claims 12, 15, 31, 32, 34, 35, 38, and 39 of U.S. Patent No. 7,220,614 and claims 1-6 and 8 of US Patent No. 7,364,942, and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

(*See* Notice of Investigation.) The investigation was instituted upon publication of the Notice of Investigation in the *Federal Register* on January 5, 2010. *See* 75 Fed. Reg. 449 (2010). 19 CFR § 210.10(b).

The complainant is Analog Devices, Inc. of Norwood, Massachusetts ("Analog"). The respondents are Knowles Electronics LLC of Itasca, Illinois ("Knowles"), and Mouser Electronics, Inc. of Mansfield, Texas ("Mouser").[1] The Commission Investigative Staff of the Office of Unfair Import Investigations is also a party in this investigation.

An evidentiary hearing was conducted before me from August 16, 2010 through August 19, 2010. Analog, Knowles, Mouser, and Staff participated in the hearing. In support of its case-in-chief and rebuttal case, Analog called the following witnesses:

- William O'Mara, Jr. (Advanced Technology Development Manager at Analog);
- Dr. John Martin (named inventor on the asserted patents);
- James Cech (Senior MEMS Engineer at Knowles); and

[1] Knowles and Mouser will be collectively referred to as "Respondents."

- Dr. Seth Miller (expert witness);

In support of their case-in-chief and rebuttal case, Respondents called the following witnesses:

- Dr. Peter Loeppert (Vice President of Research & Development for Knowles Acoustics);
- Jeffrey Niew (President & CEO of Knowles Electronics);
- Dr. Michael Pedersen (former Knowles employee);
- Dr. W. Robert Ashurst (expert witness); and
- Dr. Robert Wallace (expert witness).

In addition, various deposition transcripts were received into evidence in lieu of direct witness statements or live testimony.

After the hearing, post-hearing briefs and reply briefs were filed on September 10, 2010 and September 22, 2010, respectively.

B. The Private Parties

1. Analog

Analog is a Massachusetts corporation with its principal offices in Norwood, Massachusetts. (JX-49C at ¶ 6.) Analog manufactures and sells MEMS devices. (*Id.*)

2. Knowles

Knowles is a limited liability company organized under the laws of the State of Delaware with its principal offices in Itasca, Illinois. (JX-49C at ¶ 17.) Knowles manufactures and sells MEMS products under at least the trade name "SiSonic." (*Id.*)

3. Mouser

Mouser is a corporation organized under the laws of Delaware with its principal offices located in Mansfield, Texas. (JX-49C at ¶ 21.) Mouser sells Knowles SiSonic MEMS products

within the United States after importation as a distributor of Knowles' SiSonic MEMS products. (*Id.*)

C. Overview Of The Patents At Issue

At issue in this investigation are two patents relating to MEMS devices and products containing same.

U.S. Patent No. 7,220,614 ("the '614 patent") is entitled "Process for Wafer Level Treatment to Reduce Stiction and Passivate Micromachined Surfaces and Compounds Used Therefor." (JX-1.) The named invention is John R. Martin, and the assignee is Analog Devices, Inc. (*Id.*) The patent was filed on June 9, 2003 and issued on May 22, 2007. (*Id.*) The application leading to the '614 patent was a division of an application filed on January 29, 2001. (*Id.*) That application claims priority to a provisional application filed on February 1, 2000. (*Id.*) The Abstract of the '614 patent states:

> This invention discloses a process for forming durable anti-stiction surfaces on micromachined structures while they are still in wafer form (i.e., before they are separated into discrete devices for assembly into packages). This process involves the vapor deposition of a material to create a low stiction surface. It also discloses chemicals which are effective in imparting an anti-stiction property to the chip. These include polyphenylsiloxanes, silanol terminated phenylsiloxanes and similar materials.

(*Id.* at Abstract.)

U.S. Patent No. 7,364,942 ("the '942 patent") is entitled "Process for Wafer Level Treatment to Reduce Stiction and Passivate Micromachined Surfaces and Compounds Used Therefor." (JX-2.) The named invention is John R. Martin, and the assignee is Analog Devices, Inc. (*Id.*) The patent was filed on April 12, 2007 and issued on April 29, 2008. (*Id.*) The '942 patent is a continuation of the '614 patent. (*Id.*) The Abstract of the '942 patent states:

> This invention discloses a process for forming durable anti-stiction surfaces on micromachined structures while they are still in wafer form (i.e., before they are

> separated into discrete devices for assembly into packages). This process involves the vapor deposition of a material to create a low stiction surface. It also discloses chemicals which are effective in imparting an anti-stiction property to the chip. These include polyphenylsiloxanes, silanol terminated phenylsiloxanes and similar materials.

(*Id.* at Abstract.)

D. Products At Issue

The products accused of infringement are Knowles' SiSonic MEMS microphones made using Knowles' "dry" SAM anti-stiction process. Analog states that the following SiSonic models have been made using the accused dry SAM anti-stiction process and imported into the United States, sold for importation, or sold within the United States after importation: SP0104LE52H, SP0208LE52H, SPM0204HD52H, SPM0204HE52H, SPM0208HD52H, SPM0208HE52H, SPM0204LE5H, SPM0205HD4H, SPM0404HD5-PB-2, SPM0404HE5H-PB2, SPM0408HD5H-SB-2, SPM0404LE5H-QB-2, SPM0405HD4H-2, SPM0406HE3H-SB-2, SPM0408LE5H-TB-2, SPUL409HE5H-PB-2, SPU0409LE5H-QB-2, and SPM0404UD5. (JX-49C at ¶ 18.) Knowles manufactures products using other anti-stiction processes that are not accused of infringement; the SiSonic products made using the non-accused anti-stiction processes are not at issue in this investigation. (*See* Order No. 8.)

II. JURISDICTION

A. Subject Matter Jurisdiction

The complaint alleges that Respondents have violated Subsection 337(a)(1)(B) by the importation and sale of products that infringe the asserted patents. I find that Respondents import into the United States, sell for importation, or sell within the United States after importation products that Analog has accused of infringement in this investigation. (JX-49C at ¶¶ 18-23.) Thus, I find that the Commission has subject matter jurisdiction over this

investigation under Section 337 of the Tariff Act of 1930. *See Amgen, Inc. v. United States Int'l Trade Comm'n*, 902 F.2d 1532, 1536 (Fed. Cir. 1990).

B. Personal Jurisdiction

Respondents responded to the complaint and notice of investigation, participated in the investigation, made an appearance at the hearing, and submitted post-hearing briefs. Thus, I find that Respondents submitted to the personal jurisdiction of the Commission. *See Certain Miniature Hacksaws*, Inv. No. 337-TA-237, Initial Determination, 1986 WL 379287 (October 15, 1986). Further, Respondents admit that the Commission has *in personam* jurisdiction. (JX-49C at ¶ 16.)

C. In Rem Jurisdiction

The Commission has *in rem* jurisdiction over the products at issue by virtue of the finding that accused products have been imported into the United States. *See Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 985 (C.C.P.A. 1981). Further, Respondents admit that the Commission has *in rem* jurisdiction over the accused SiSonic MEMS products imported by Knowles. (JX-49C at ¶ 24.)

III. CLAIM CONSTRUCTION

A. Applicable Law

"An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996) (citation omitted). Claim construction "is a matter of law exclusively for the court." *Id.* at 970-71. "The construction of claims is simply a way of elaborating the normally terse claim

language in order to understand and explain, but not to change, the scope of the claims." *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1347 (Fed. Cir. 2000). "[O]nly those [claim] terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Claim construction focuses on the intrinsic evidence, which consists of the claims themselves, the specification, and the prosecution history. *See generally Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). The Federal Circuit in *Phillips* explained that in construing terms, courts must analyze each of these components to determine the "ordinary and customary meaning of a claim term," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313.

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Id.* at 1312 (citations omitted). "Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms." *Id.* at 1314. For example, "the context in which a term is used in the asserted claim can be highly instructive," and "[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term." *Id.*

"[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (citation omitted). "The longstanding difficulty is the contrasting nature of the axioms that (a) a claim must be read in view of the specification and (b) a court may not read a limitation into a claim from the specification." *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1117 (Fed. Cir. 2004). The Federal Circuit has explained that there are certain

instances when the specification may limit the meaning of the claim language:

> [O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs. In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor. In that instance as well, the inventor has dictated the correct claim scope, and the inventor's intention, as expressed in the specification, is regarded as dispositive.

Phillips, 415 F.3d at 1316.

In addition to the claims and the specification, the prosecution history should be examined if in evidence. "The prosecution history…consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent. Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Id.* at 1317 (citation omitted). "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony and learned treatises. *Id.* at 1317. Extrinsic evidence is generally viewed "as less reliable than the patent and its prosecution history in determining how to read claim terms[.]" *Id.* at 1318. "The court may receive extrinsic evidence to educate itself about the invention and the relevant technology, but the court may not use extrinsic evidence to arrive at a claim construction that is clearly at odds with the construction mandated by the intrinsic evidence." *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999).

B. The '614 Patent

1. "A Compound Having Anti-Stiction Properties"

The phrase "a compound having anti-stiction properties" appears in asserted claims 12, 15, 31, 32, and 34 of the '614 patent and asserted claim 1 of the '942 patent.

Analog's Position: Analog contends that this phrase means "a compound that reduces surface energy and prevents sticking between microstructure surfaces."

Analog claims that there can be no dispute that Analog's proposed construction represents the plain and ordinary meaning of the phrase as it is used by the asserted patents. (Citing JX-1 at 1:35-40, 4:11-20.) Based on these cited passages from the patents' specification, Analog states that a compound having anti-stiction properties (a) reduces surface energy; and (b) prevents sticking between microstructure surfaces. (*Id.*)

Analog states that Respondents' proposed construction seeks to limit the phrase to specific examples, but the construction does not include all of the examples identified in the asserted patents. (Citing JX-1 at 7:29-31, 7:19.) Analog argues that the construction is incorrect because it narrows a broad term to specific examples. Analog states that the examples used in the specification were not intended to limit the scope of the claims, but were only intended to serve as representative samples. (Citing JX-1 at 7:32-39.) Analog asserts that to the extent that the claims refer to "a compound having anti-stiction properties," one of ordinary skill in the art would understand the term to include any member from the classes of suitable anti-stiction compounds, regardless of whether or not the compound was specifically identified in the specification. Analog notes that Dr. Miller testified that the examples of suitable anti-stiction compounds would be too numerous to list. (Citing Tr. at 334:16-23.)

Analog notes that unasserted dependent claims 13 and 14 further limit the compound of

claim 12 to specific compounds or classes of compounds. (Citing JX-1 at 18:54, 18:66-19:4, 19:5-10.) Analog argues that Respondents' proposed construction cannot be correct because it would make claim 13 meaningless and claim 14 largely redundant.

Analog states that Respondents are incorrect to try to limit the compound to a compound that does not have long chain alkyl groups or any chloro silane or trichloro silane. Analog asserts that this limitation is not suggested anywhere in the patents. Analog argues that contrary to Respondents' position, the patents expressly state that the invention does not preclude the use of materials that contain chlorine, and the patents define the term "silane" to include compounds with chlorine substituents. (Citing JX-1 at 3:38-41, 7:34-39; Tr. at 592:5-8.)

In its reply brief, Analog states that under the constructions proposed by Analog and Staff, the patents provide detailed notice to the public concerning the scope of the claims. Analog claims that the specification limits the universe of suitable anti-stiction compounds to organo silicon compounds. (Citing JX-1 at 7:1-43.) Analog states that according to the proposed constructions of Analog and Staff, the scope of the term "a compound having anti-stiction properties" would be limited to organo silicon compounds that prevent sticking between the subcomponents (or microstructure surfaces) of a MEMS device.

Analog argues that Respondents seek to limit the meaning of the phrase based on language from the specification concerning liquid-phase treatments in the prior art. (Citing JX-1 at 6:8-50.) Analog states that Respondents ignore that this description is of the prior art, and not the inventions. According to Analog, the patents clearly distinguish Dr. Martin's inventions from these prior art treatments. (Citing JX-1 at 6:9-15, 6:48-50.)

Analog claims that the patents do not teach away from compounds with long-chain alkyl groups. Analog asserts that the intrinsic record demonstrates that the patents do not exclude the

use of compounds with long-chain alkyl groups. (Citing RX-203C at Q. 128; JX-1 at Fig. 3, 5:28-31.)

Respondents' Position: Respondents contend that "a compound having anti-stiction properties" means "a compound selected from the various specific compounds disclosed in the written description of the specification, namely Hexaphenyl cyclotrisiloxane, Silanol terminated polydiphenylsiloxane; tetraphenyldisoloxanediol, hexaphenyldisoloxane octaphenyl cyclotetrasiloxane; triphenyl silane; triphenylsilanol; 1,1,3,5,5-pentaphenyl-1,3,5-trimethyl-trisiloxane; hexamethyl disilazane (HDMS); diphenylsilanediol." Respondents add that in the event Analog's or Staff's construction is adopted, such construction should include the limitation that the compound may not be a compound with long chain alkyl groups or any chloro silane or trichloro silane.

Respondents claim that the patents-in-suit do not directly address what is meant by "a compound having anti-stiction properties." According to Respondents, the patents first disclose a broad "universe" of potential organo silicon compounds, providing four very broad categories of compounds to generally define the term "organo-silicons." (Citing JX-1 at 7:1-14.) Respondents claim that there are many compounds included within these broad categories that fit the thermophysical properties in context, but cannot be anti-stiction compounds or are not known to impart anti-stiction properties.

Respondents claims that Analog appears intent to rely on the language stating "[a]s used in this application, the term silane includes compounds that contain at least one organic group, at least one silicon atom and at least one other substituent, which is likely to be either hydrogen, chlorine, an alkoxy group or a hydroxyl group." (Citing JX-1 at 7;14-43.) Respondents assert

that Analog is incorrect to argue that definition of what a silane is means that any silane can be a "compound having anti-stiction properties."

Respondents claim that if the anti-stiction compounds are considered to include the broad universe of potential organo-silicon compounds identified in the disclosure, one of ordinary skill in the art would not be able to understand what is claimed. According to Respondents, defining "a compound having anti-stiction properties" as according to the result to be achieved would render both patents invalid for lack of enablement. Respondents assert that such a construction would require undue experimentation by one of ordinary skill in the art to ascertain the scope of the claims, since one would have to perform extensive experimentation stretching, potentially, years before one would know the full scope of the claims. Respondents state that a construction which inevitably demands extensive experimentation and possibly new invention to determine its scope cannot meet this stated aim of the §112 requirement.

Respondents note that their proposed construction affords to Analog the full benefit of its disclosure, namely, those compounds it has identified. Analog and Staff's interpretation fail to limit the claims to what the specification evidences the inventor had possession of as of the filing date, but instead stretches far beyond that limit. Respondents argue that the specification of either patent discloses no particular species of long-chain, fluorinated, chlorosilane compound to support a claim to a genus containing such a species.

Respondents assert that in the event that Analog is found to be entitled to claim more than the specific compounds identified, its claims still must be limited to only that which it has identified as its invention and limited to exclude that which Analog specifically has taught away from. Namely, Respondents allege that the '614 and '942 patents teach away from compounds having long-chain alkyl groups and chlorosilanes. (Citing JX-1 at 6:24-28.)

Respondents asserts that the inventor's preference to not use compounds having chlorosilanes is reaffirmed in the prosecution history. (Citing JX-3 at ANALOG00006217.) Respondents argue that statements like those found in the prosecution history which discourage against experimentation with specific compounds have been held to prevent a patentee from claiming such compounds as part of his invention. (Citing *AK Steel Corp. v. Sollac and Ugine* 344 F.3d 1234, 1244 (Fed. Cir. 2003).)

Further, Respondents claim that the inventor's limited list of categories of chemicals in the "Summary of Invention" section limits the scope of any claimed compound, if expanded beyond the specific chemicals given, to those genera of chemicals which the inventor identified as his invention. (Citing *C.R. Bard, Inc. v. U.S. Surgical Corp.* 388 F.3d 858, 864 (Fed. Cir. 2004).) Knowles claims that the Summary of Invention sections clearly state the inventor's invention as "durable anti-stiction surfaces . . . on micromachined structures while they are still in wafer form. . . . It also discloses chemicals which are effective in imparting an anti-stiction property . . . These include phenyl alkoxysilane, polyphenylsiloxanes, silanol terminated phenylsiloxanes and similar materials." (Citing JX-1 at 1:61-2:2.)

In their reply brief, Respondents argue that Analog's and Staff's construction would render the claims indefinite because the constructions result in vaguely-worded functional language. Respondents claim that there is no clear means by which a skilled artisan could determine whether or not a compound is successful in reducing stiction without experimentation. (Citing Tr. at 699:23-700:20.) Respondents argue that Analog ignores an aspect of the patents that Analog alleges is a key point of novelty – thermal stability and non-interference with wire bonding. (Citing CIB at 13-14.)

Respondents argue that Analog's and Staff's construction are not supported by the written description in the specification, and therefore violate § 112. Respondents claim that there is no evidence that the inventor had possession of the breadth of scope of the claims as Analog alleges – i.e., every conceivable compound operative to impart anti-stiction properties. Respondents argue that Analog's claim differentiation argument with respect to claims 13 and 14 shows that claim 12 is overly broad and lacks written description support. Knowles argues that Analog's construction is not enabled with regard to long-chain alkyl groups or chlorosilanes because of the at best ambiguous treatment of such substances in the specification. (Citing JX-1 at 6:29-35.)

Staff's Position: Staff contends that "a compound having anti-stiction properties" means "a compound, such as phenyl alkoxysilanes, polyphenyl-siloxanes, silanol terminated phenylsiloxanes, and other similar materials, which are effective in preventing the sticking of micro-components." (Citing JX-1 at 1:35-40, 1:66-2:2.)

Staff argues that Respondents' construction should be rejected because it improperly narrows the scope of the claims using the specific examples listed in the specification. Staff argues that Analog's construction is too broad because it encompasses the entire universe of anti-stiction compounds and overlooks the explicit description of the anti-stiction compounds contemplated by the inventor.

In its reply, Staff addresses Respondents' position that the term cannot be construed to include chlorosilanes because of a slide presentation offered during prosecution. (Citing RIB at 29.) Staff argues that this slide presentation was not a clear and unmistakable disavowal of all chlorosilanes. (Citing JX-3.)

Construction to be applied: "a compound that prevents sticking between surfaces."

Asserted claims 12, 15, 31, 32, and 34 of the '614 patent and asserted claim 1 of the '942 patent require "a compound having anti-stiction properties." The Background of the Invention describes the problem of stiction in MEMS devices:

> The airbag sensor has a sub-component which moves in response to the inertial changes that arise during rapid deceleration. The failure of this subcomponent to move during deceleration can be caused by the sticking of this micro-subcomponent to other components in its immediate environment. ***This concept of sticking is called "stiction", and the concept of preventing sticking from occurring is called "anti-stiction".***

(JX-1 at 1:33-40) (emphasis added). From this passage, it is clear that "a compound having anti-stiction properties" is one which prevents sticking between subcomponents in a MEMS device.

Respondents seek to limit the meaning of this phrase to the specific anti-stiction compounds identified in the specification. Specifically, Respondents assert that the phrase means "a compound selected from the various specific compounds disclosed in the written description of the specification, namely Hexaphenyl cyclotrisiloxane, Silanol terminated polydiphenylsiloxane; tetraphenyldisoloxanediol, hexaphenyldisoloxane octaphenyl cyclotetrasiloxane; triphenyl silane; triphenylsilanol; 1,1,3,5,5-pentaphenyl-1,3,5-trimethyl-trisiloxane; hexamethyl disilazane (HDMS); diphenylsilanediol."

A review of the dependent claims in the '614 patent reaveals that Respondents' proposed construction is overly narrow. Claim 1 is an independent claim that requires "a compound having anti-stiction properties." Claim 2 depends on claim 1 and limits the anti-stiction compound to certain classes of compounds: "wherein said compound is an organo silicon compound selected from the group consisting of alkylsilanes, phenylsilanes, phenylalkylsilanes, alkoxysilanols, alkylsilanols, phenylsilanols, phenylalkylsilanols, alkoxysiloxanes, alkylsiloxanes, phenylsiloxanes, and phenylalkylsiloxanes." Claim 4 depends from claim 1 and limits the anti-stiction compound to specific compounds: "wherein said compound is selected

from the group consisting of diphenylsilanediol, a diphenylsiloxane, hexaphenyldisiloxafle, silanol-terminated diphenylsiloxane, silanol-terminated polydiphenylsiloxane, tetraphenyldisiloxanediol, triphenyl silane, triphenylsilanol, and mixtures thereof." Similar limitations can be found in claims 13 and 14, which depend on independent asserted claim 12. (JX-1 at 18:49-19:10.)

Respondents' proposed construction, which lists a finite universe of anti-stiction compounds, runs counter to the dependent claims further limiting the compound to specific classes of compounds or specific compounds. The presence of the dependent claims demonstrates that the patentee did not intend to limit the meaning of "a compound having anti-stiction properties" to a list of specific compounds, as proposed by Respondents. *Phillips*, 415 F.3d at 1314 ("Other claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term.")

Respondents offer no sufficient justification for limiting the meaning of "a compound having anti-stiction properties" based on the examples provided in the specification. While the specification may limit the meaning of a claim term if there is evidence that the inventor acted as his own lexicographer, or if there is a clear disavowal of claim scope, Respondents make no such assertions. *Phillips*, 415 F.3d at 1316. It is therefore improper to import limitations from the specification into the claim, as proposed by Respondents. *Trading Techs. Int'l, Inc. v. eSpeed, Inc.*, 595 F.3d 1340, 1352 (Fed. Cir. 2010) ("When consulting the specification to clarify the meaning of claim terms, courts must not import limitations into the claims from the specification.")

Respondents' arguments supporting their construction raise issues regarding the written description, enablement, and definiteness requirements of 35 U.S.C. § 112. Specifically,

Respondents argue that if Analog's or Staff's construction is adopted, then the claims are invalid because they fail to meet these § 112 requirements. These issues are addressed in the invalidity analysis, found in Section IV.B, *infra*.

Respondents argue that in the event Analog's or Staff's construction is adopted, such construction should include the limitation that the compound may not be a compound with long chain alkyl groups or any chloro silane or trichloro silane. Respondents base this argument on the following passage from the specification:

> Microstructures are often made by depositing thin films over a sacrificial layer on wafers. Silicon-on-insulator and various techniques that bond wafers together are also used. After patterning, the sacrificial material is commonly removed (i.e., "released") in a process that uses liquid etchants and rinses. As the liquid dries, surface tension draws the microstructures into contact, where they stick unless anti-stiction treatments or some other preventative technique are used. ***Unfortunately, surface treatments optimized for in-process stiction have limited thermal and oxidative stability so they do not adequately survive high volume hermetic packaging processes. Treatments that form long chain alkyl groups on the microstructure surfaces are an example of this limitation. Some surface treatments are also based on chlorosilanes. Chlorosilanes raise reliability concerns because chloride residue on aluminum interconnects and bond pads can cause corrosion failures.***

(JX-1 at 6:16-32) (emphasis added).

I decline to adopt the proposed limitation sought by Respondents. As Analog notes, the above-quoted passage is addressing a prior art "in-process" anti-stiction treatment that the inventor distinguishes from his own invention. In the preceding paragraph, the specification states:

> Work has been published on wafer level treatments to suppress in-process stiction of microstructures. ***In-process stiction occurs during wafer processing immediately after the structures are "released". In contrast, the present invention is applied to wafers that contain microstructures that have already been released and are functional, in air or some other gaseous environment. This distinction is further discussed in the following paragraph.***

(JX-1 at 6:9-16) (emphasis added). The specification concludes the discussion of the prior art

"in-process" anti-stiction treatment by explaining that "[t]his patent application discloses techniques for imparting the anti-stiction property to microstructures on these wafers, said techniques avoiding the above limitations." (*Id.* at 6:50-52.) Therefore, it is clear that the limitations sought by Respondents are not related to the inventions disclosed in the asserted patents, but instead to a prior art process that the patents are distinguishing and improving upon.

Analog also seeks to include a limitation in the construction requiring that the compound reduces surface energy. Analog arrives at this limitation from a disclosure in the specification that "a vapor treatment that creates thin organic surfaces on any inorganic microstructure…will reduce surface energy and thus suppress stiction." (JX-1 at 4:16-20.) From this passage, it becomes clear that for a compound to suppress stiction, it will necessarily reduce surface energy. Therefore, I find that the inclusion of Analog's surface energy language in the construction is unnecessary in light of the adopted construction.

In its reply brief, Analog implies that the construction should be further limited to organo silicon compounds. (CRB at 9.) Inclusion of such a limitation would run contrary to the doctrine of claim differentiation, which refers to "the presumption that an independent claim should not be construed as requiring a limitation added by a dependent claim." *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006). Here, claim 34 of the '614 patent requires "a compound having anti-stiction properties." Claim 35 is depends from claim 34 and adds a single limitation: "[t]he method of claim 34 wherein said compound is an organo silicon compound." Construing "a compound having anti-stiction properties" to require an organo silicon compound would run contrary to the doctrine of claim differentiation, and Analog has not provided a justification for rebutting the presumption that claims 34 and 35 are different in scope.

Staff's proposed construction seeks to add a list of exemplary compounds – "such as phenyl alkoxysilanes, polyphenyl-siloxanes, silanol terminated phenylsiloxanes, and other similar materials." Staff bases this language on a passage from the Summary of the Invention, which states that "[the invention] also discloses chemicals which are effective in imparting an anti-stiction property to the chip. These include phenyl alkoxysilanes, polyphenylsiloxanes, silanol terminated phenylsiloxanes and similar materials." (JX-1 at 1:66-2:2.) Staff's inclusion of a non-limiting list of examples is unnecessary and does not add any further limitation to the construction of the phrase "a compound having anti-stiction properties." Therefore, it is not included in the adopted construction.

Based on the foregoing, I find that "a compound having anti-stiction properties" means "a compound that prevents sticking between surfaces."

2. "A Temperature Sufficient to Vaporize"

The phrase "a temperature sufficient to vaporize" appears in asserted claims 12, 15, 31, and 32[2] of the '614 patent and asserted claims 1 and 2 of the '942 patent.

Analog's Position: Analog contends that "a temperature sufficient to vaporize" means "a temperature sufficient to convert a liquid or solid into a vapor by the application of heat, by reducing pressure, or by a combination of those processes, but not so high as to damage the wafer."

Analog asserts that the patents disclose the use of anti-stiction compounds that can be liquids or solids. (Citing JX-1 at 8:12-13.) Analog states that the compounds have different vapor pressures and that temperatures can be adjusted accordingly to maintain equivalent deposition rates. (Citing JX-1 at 8:32-35.) Analog claims that the specification explains that the temperature must be hot enough to vaporize the anti-stiction compound but not so hot as to

[2] Claims 15 and 32 additionally require that the temperature be "predetermined."

damage the wafer. (Citing JX-1 at 8:47-51.) Analog states that the patents note that the deposition process may occur in a low pressure environment. (Citing JX-1 at 8:51-52.)

Analog asserts that its proposed construction incorporates these important concepts from the patents. Analog notes that Dr. Wallace agrees that Analog's proposed construction represents what one of ordinary skill in the art would understand the term to mean absent some extraordinary rule of claim construction. (Citing Tr. at 444:3-17.)

Analog argues that Respondents' proposed construction – "100-500 degrees centigrade" – cannot be reconciled with the specification. Analog notes that the patents discuss two broad categories of anti-stiction compounds: (1) compounds having very low volatility at or near room temperature; and (2) compounds with moderate volatility at room temperature. According to Analog, the patents state that heating between 100 and 500 degrees Celsius has been found to be acceptable for compounds have very low volatility. (Citing JX-1 at 8:57-61.) Analog argues that Respondents ignore the portion of the specification devoted to compounds having moderate volatility, which states that such compounds do not need to be heated to 100-500 degrees Celsius to generate sufficient vapor for the deposition process. (Citing JX-1 at 9:19-23, 9:36-39.) Analog claims that Dr. Ashurst acknowledged this as well. (Citing Tr. at 596:18-597:1.)

In its reply brief, Analog states that Respondents ignore that their expert Dr. Ashurst admitted at trial that HMDS, an anti-stiction compound, does not need to be heated to 100 degrees Celsius to generate sufficient vapor for the deposition process described in the patents. (Citing Tr. at 596:18-597:1.) Analog claims that the Respondents are wrong to assert that the discussion of HMDS in the patents only concerns the prior art. (Citing RIB at 24; JX-1 at 3:33-37; CX-157C at Q. 69.) According to Analog, Respondents' argument is undermined by their

admission that HMDS is an acceptable anti-stiction compound. (Citing Tr. at 596:9-12; RIB at 27.)

Analog asserts that nothing in the specification requires that the anti-stiction material must be brought to a boil during the deposition process. (Citing Tr. at 597:20-22, 600:12-16.) Analog argues that the boiling points of materials at atmospheric pressure have no relevance to the deposition process performed at low pressure in a vacuum oven. (Citing JX-1 at 8:51-52.) Analog claims that the specifications reference to a "splatter shield" does not mandate that the anti-stiction compound must be boiled. Analog notes that the embodiment of Figure 4 does not include a splatter shield, and that the purpose of the splatter shield in Figure 5 is to protect against bubbles bursting as water and gasses trapped inside of the solid anti-stiction material escape and diffuse out at high temperatures. (Citing JX-1 at 8:30-31, Figs. 4-5; CX-239C at Q. 110.)

Finally, Analog addresses Respondents' argument that the patents suggest that almost all of the liquid anti-stiction compound evaporates during the deposition process. Analog claims that this argument is based on language describing a prior art process, and not the claimed invention. (Citing RIB at 25-26; JX-1 at 6:35-42; JX-34 at 2:1-9.)

Respondents' Position: Respondents contend that "a temperature sufficient to vaporize" should be construed to mean "100-500 degrees centigrade."

Respondents assert that Analog's definition includes a process of reducing pressure, which is a completely difference property than temperature. Respondents state that their proposed definition, unlike Analog's definition, is not couched in functional language and provides a definite upper and lower limit.

Respondents claim that Analog's definition of applying heat, reducing pressure, or a

combination of the two is so broad that there would be no way to determine a temperature sufficient to vaporize. (Citing RX-203C at Q. 43.) Respondents assert that the specification specifically defines a temperature sufficient to vaporize as 100-500°C. (Citing JX-1 at 8:47-64.) Respondents claim that the cited portion of the specification disclosing 100-500°C is the only definite guidance provided to one of ordinary skill in the art to clarify the ambiguity of the claim language. Respondents argue that the disclosure of a temperature range of 100-500°C took into account the various factors described in the specification. (Citing JX-1 at 8:48-59.)

Respondents assert that the discussion of HMDS relied on by Analog is a prior art process. (Citing Tr. at 596:5-597:11; JX-34 at 1:35-39.) Respondents claim that if Analog's proposed construction is adopted, it serves as an admission of invalidity. Respondents further note that the specification reaffirms the 100-500°C temperature range after the discussion of HDMS. (Citing JX-1 at 9:64-10:15.)

Respondents assert that the normal boiling points for the compounds discussed by name in the specification all fall within the range of 100-500°C. (Citing RX-203C at Q. 49.) Respondents state that it is undisputed that it is impossible not to heat HMDS to 100°C in the arrangement shown in Figure 5. (Citing Tr. at 702:12-16.) Respondents state that the patents also call for the use of a splatter shield, which indicates that the invention requires boiling the anti-stiction compound. (Citing RX-203C at Q. 46.)

Respondents claim that the patent suggests that "almost all of the liquid" anti-stiction compound evaporates, further indicating that the compound is heated between 100-500°C. (Citing JX-1 at 6:37-39.) According to Respondents, this disclosure supports their construction despite referring the prior art '740 patent because the patents not only incorporate the '740 patent by reference, but also share many of the same anti-stiction compounds. (Citing JX-1 at 5:46-48.)

In their reply brief, Respondents argue that Analog's proposed construction provides no real limitation and would render the claims indefinite. According to Respondents, Analog's construction has no meaningful boundaries and essentially writes the limitation completely out of the claim.

Respondents argue that Analog's proposed construction lacks written description support. Respondents note that Analog relies on Dr. Wallace's testimony to support its proposed construction, but neither Analog nor Dr. Wallace explains where in the specification one of ordinary skill in the art is shown how to discern the temperature sufficient to vaporize the identified chemicals. According to Respondents, Analog cannot point to any written description support outside of the disclosure of the acceptable range of 100-500°C.

Respondents argue that Analog's proposed construction is not enabled. Respondents reiterate that the specification discloses that the 100-500°C range is an acceptable temperature range. (Citing JX-1 at 9:64-10:15.) Respondents assert that the patents teach away from other limitations beyond the 100-500°C range. Thus, Respondents states that the breadth of Analog's definition is not enabled because the specification teaches against what is alleged to be a claimed temperature (i.e. a temperature outside of the 100-500°C range).

Staff's Position: Staff concurs with Analog's proposed construction of "a temperature sufficient to vaporize."

Staff claims that the specification discloses two distinct methods – a method that may be run at 100-500°C when using anti-stiction compounds having low volatility, and a method that may be run using compounds that have moderate volatility at or near room temperature. (Citing JX-1 at 8:47-9:23.) Staff argues that Respondents' construction is flawed because it unnecessarily limits the scope of the claims to specific embodiments and excludes the

embodiments claimed in asserted claims 34, 35, 38, and 39.

In its reply, Staff asserts that Respondents' proposed construction improperly ignores the process described in the specification concerning HMDS and other compounds having moderate volatility at or near room temperature. Staff claims that the fact that the fact that such a process is also found in the prior art '740 patent is not a reason for excluding it altogether. Staff asserts that a proper construction must include the use of compounds that vaporize at low temperatures near room temperature as well as compounds that vaporize at high temperatures. (Citing JX-1 at 8:47-64, 9:19-39.)

Regarding Respondents' argument that the specification does not describe the vapor pressure, Staff claims that the specification describes the variables to consider when choosing the appropriate temperature to vaporize a selected compound. (Citing JX-1 at 8:32-64, 9:19-39, 9:52_61.) Thus, Staff asserts that Respondents' argument should be rejected.

Construction to be applied: "a temperature sufficient to convert a liquid or solid into a vapor."

Many of the asserted claims require heating the anti-stiction compound to "a temperature sufficient to vaporize said compound."

The specification includes discussion of the temperature. The specification explains:

> The temperature to which the oven is heated is important, since the temperature must be hot enough to vaporize the organo silicon compound but not so hot that any component of the system or the wafer that is being treated will be damaged. It should be noted that a vacuum oven is used in some implementations of this invention. In addition, the time during which the heating process takes place is also a factor. Thus a relatively low temperature, which will cause a low rate of vaporization, will be acceptable if the heating step takes place over a relatively long period of time. Considering all of these factors, heating taking place between approximately 100° and 500° C. has been found to be acceptable, with the heating range being preferably between approximately 300° and 500° C. if the wafer, or other substrate, can tolerate this range. Many substrates are coated at lower

> temperatures (e.g., 100°-300° C.) due to limited thermal stability of elements contained on or in them.

(JX-1 at 8:47-64.)

The specification also discloses the use of Hexamethyldisilazane ("HMDS") as an anti-stiction compound. (JX-1 at 9:24-28.) The specification notes that the compounds discussed prior to HMDS have very low volatility at, or near, room temperature. (*Id.* at 9:19-23.) The specification states that HMDS exhibits moderate temperature volatility. (*Id.*) The specification explains how HMDS is used as an anti-stiction compound:

> In order to take advantage of the anti-stiction properties of HMDS, it can be applied to either individual chips or to boat loads of wafers (before they are sawed into chips), by use of the same equipment that is commonly used to deposit HMDS for enhancing the adhesion of photoresist. This equipment is a vacuum oven, typically heated to 220°-250° C., with a reservoir that holds HMDS, which is a liquid at room temperature (FIG. 4 illustrates a modified form of such an oven). HMDS has an appreciable vapor pressure at room temperature so, when a valve that isolates the reservoir from the oven is opened, HMDS vapor flows into the oven and reacts with the hot wafer surfaces.

(JX-1 at 9:28-39.)[3] The specification also notes that other moderate volatility compounds may be used:

> The above example used HMDS. However, similar equipment (perhaps with a heated reservoir and heat traced tubing) can be used to treat wafers with any organic, liquid or solid, that has moderate volatility. For example, as noted above, diphenylsilanediol decomposes above 140° C., but is quite stable near room temperature. Thus, this type of oven can be used with diphenylsilanediol (placed in the reservoir either neat, or in a solvent). Once in the hot oven, the diphenylsilanediol vapor reacts quickly with hot wafer surfaces to give a stable, low energy surface passivation.

(*Id.* at 9:52-61.)

The specification adds that mixtures of compounds may be used: "[i]n addition to the specific anti-stiction compounds disclosed above, it should be noted that mixtures of these

[3] Respondents assert that the specification's discussion of HMDS relates to the prior art. (RIB at 24.) Contrary to Respondents' assertion, I find that the specification's discussion of HMDS is in the context of the claimed invention, and not the prior art. (*See* JX-1 at 9:24-61.)

compounds can be used as an anti-stiction agent. Considering the variety of anti-stiction compounds that can be used, the oven temperature can range from about 100°-500° C." (JX-1 at 9:62-66.)

Respondents seek to limit the meaning of "a temperature sufficient to vaporize" to a range of 100°-500° C. Respondents base their construction on the passage from the specification quoted *supra* that states that "heating taking place between approximately 100° and 500° C. has been found to be acceptable[.]" (JX-1 at 8:57-59.)

Respondents' construction is overly narrow and improperly limits the claims based on the specification. The specification may limit the claims when the patentee "demonstrate[s] an intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002).

No such disclaimer of claim scope exists here. The passage upon which Respondents rely relates to certain disclosed embodiments. (JX-1 at 8:47-64, 9:19-21.) There is no indication in the specification that the patentee intended to limit the meaning of "temperature sufficient to vaporize" to the range of 100-500°C.[4]

Respondents offer additional arguments to support their construction, none of which are persuasive. Respondents point to Dr. Ashurst's testimony that the normal boiling points for the compounds discussed by name in the specification all fall within the range of 100-500°C. (RX-203C at Q. 49.) Such testimony is irrelevant, as Respondents have failed to identify any intrinsic evidence that addresses the relevance of the boiling point. The word "boil" does not appear in

[4] In addition, I find no evidence that the patentee acted as his own lexicographer and defined the temperature as one falling in the range of 100-500° C. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) ("[T]he claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history.")

the '614 or '942 patents.

Respondents claim that the fact that Figure 5 includes a splatter shield indicates that the invention requires boiling the anti-stiction compound. (RIB at 25; RX-203C at Q. 46.) In describing the CVD furnace of Figure 5, the specification states that "the coating material 17 is placed in a container 19, which is also within the enclosure, said container shown with a shield 18 to suppress splattering." (JX-1 at 8:29-31.) Respondents fail to explain how they make the leap in logic from the disclosure of a splatter shield to a belief that the anti-stiction compound ***must*** be boiled. Furthermore, even if the presence of a splatter shield meant that the anti-stiction compound must be boiled, Figure 5 only depicts a "typical CVD furnace," and limiting the claims to this disclosed embodiment would be improper. *Trading Techs.*, 595 F.3d at 1352.

Finally, Respondents argue that the specification suggests that "almost all of the liquid" anti-stiction compound evaporates, further indicating that the compound is heated between 100 and 500°C. (JX-1 at 6:37-39.) Respondents do not explain how this disclosure supports a finding that the "temperature sufficient to vaporize" should be understood to mean 100-500°C. Moreover, the cited passage addresses the prior art process described in the '740 patent, and the specification makes clear that the current invention seeks to "avoid the...limitations" of the '740 patent. (JX-1 at 6:35-50.)

Analog's proposed construction reads, in part, "a temperature sufficient to convert a liquid or solid into a vapor by the application of heat, by reducing pressure, or by a combination of those processes..." It is unclear why Analog includes reference to pressure in its proposed construction. The "temperature sufficient to vaporize" relates to the temperature applied, and not the amount of pressure applied. Analog cites no intrinsic evidence that explains its inclusion of the pressure component. Analog cites to a portion of the specification that explains that different

materials have different vapor pressures such that the deposition temperature range can vary. (JX-1 at 8:32-35.) But that passage does not warrant the construction proposed by Analog.

The specification makes clear that the anti-stiction compound will be in liquid or solid form. (*See, e.g.,* JX-1 at 8:11-13.) By the plain language of the claims, "a temperature sufficient to vaporize" means a temperature sufficient to convert the anti-stiction compound into vapor form.

Based on the foregoing, I find that "a temperature sufficient to vaporize" means "a temperature sufficient to convert a liquid or solid into a vapor."[5]

3. "Sawing"

The term "sawing" appears in asserted claims 12, 15, 31, 32, and 34 of the '614 patent and asserted claim 1 of the '942 patent.

Analog's Position: Analog contends that "sawing" means "cutting or separating." Analog asserts that the patents use the terms "separate," "cut," and "saw" synonymously throughout. (Citing JX-1 at 1:61-64, 6:1-2, 7:46-48, 9:28-31.) Analog notes that Dr. Wallace and Dr. Ashurst both testified that a person of ordinary skill in the art would have understood the terms "sawing" and "separating" in the patents to be synonymous. (Citing Tr. at 479:5-13, 614:20-615:3.)

Analog states that Respondents' construction that requires the use of a blade is a fiction created by counsel and has no support in the patents-in-suit. Analog asserts that Dr. Ashurst acknowledged that a person of ordinary skill in the art in 2000 would have known many ways to separate a wafer, including the use of laser ablation saws. (Citing Tr. at 615:24-616:12.) Analog claims that the patents say nothing about mechanically cutting with a blade or using a blade.

[5] Respondents assert that Analog's proposed construction runs afoul of § 112. That issue and the related arguments are addressed in Section IV.B, *infra*.

(Citing Tr. at 615:4-10.)

Respondents' Position: Respondents contend that "sawing" means "mechanically cutting with a blade such as a diamond wafer saw."

Respondents argue that at the time of filing the patents-in-suit, there were separate and distinct ways of singulating MEMS dies from a wafer. (Citing RX-203C at Q. 99, 100.) Respondents claims that contemporaneous literature distinguished sawing from other modes of separation. (Citing RX-641 at 176-177.) Respondents assert that Dr. Miller agreed with this at trial. (Citing Tr. at 288:7-23.)

Respondents assert that the only manner of separation that is identified in the patents-in-suit is sawing, which is commonly understood to mean cutting with a blade. (Citing RX-203C at Q. 101.) Respondents note that there were other methods of singulation known at the time, but the intrinsic evidence does not support including those methods within the scope of the claims. (Citing RX-203C at Q. 103, 105-106.) Respondents argue that the patents-in-suit shouldn't be allowed to cover singulation processes that were not even known at the time of the invention. (Citing *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1353 (Fed. Cir. 2010).)

In their reply brief, Respondents argue that Analog is incorrect in its assertion that the patents-in-suit do not discuss any specific means of singulation. (Citing CIB at 27.) Respondents claim that the patents only discuss sawing, and that sawing was understood to mean mechanically sawing with a blade such as a diamond wafer saw. (Citing RX-641 at 177; Tr. at285:4-286:18; RX-203C at Q. 99.) Respondents argue that the term "separating" is much broader than the term "sawing," and Analog is wrong to equate the two. (Citing RX-203C at Q. 99, 100-101; RX-644C at Q. 133.)

Staff's Position: Staff contends that "sawing" means "separating." Staff states that the

specification uses the term "sawing" and "separating" interchangeably, indicating that sawing is not distinct from separating. (Citing JX-1 at Abstract, 1:61-64, 17:36-39.)

Staff argues that Respondents' proposed construction is not supported by the intrinsic evidence, and Dr. Ashurst admitted this during cross-examination. (Tr. at 615:7-10.) Staff notes that Dr. Ashurst also admitted that one of ordinary skill in the art would understand that the use of the term "sawing" in the '614 patent means cutting or separating. (Citing Tr. at 614:25-615:10.)

In its reply brief, Staff asserts that "sawing" should include any means of separating because the intrinsic evidence does not limit sawing to a mechanical blade. Staff claims that laser dicers were known in the industry at the time of filing. (Citing Tr. at 615:7-616:12, 318:8-17.) Staff believes that the term "sawing" in the patents should be construed to include all means of separating a wafer, including separating with a laser.

Construction to be applied: "cutting"

Claim 12 of the '614 patent requires, *inter alia*, "sawing said wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound..." Claims 15, 31, 32, and 34 of the '614 patent and claim 1 of the '942 patent also include a "sawing" limitation that requires sawing a wafer to form a plurality of microelectromechanical devices.

The Summary of the Invention states that "[t]his invention discloses a process for forming durable anti-stiction surfaces on micromachined structures while they are still in wafer form (i.e., before they are separated into discrete devices for assembly into packages)." (JX-1 at 1:61-64.) The specification includes the following references to wafer singulation:

- "Thus, in some cases, the wafer is not cut into chips, but the entire wafer is used for one device." (JX-1 at 6:1-2.)

- "Deposition at this point in the manufacturing process (i.e., after the wafer was cut) minimized thermal and oxidative degradation." (JX-1 at 7:46-48.)

- "After cooling, the wafers were removed and cut into chips, which were later assembled into packages." (JX-1 at 9:15-16.)

- "In order to take advantage of the anti-stiction properties of HMDS, it can be applied to either individual chips or to boat loads of wafers (before they are sawed into chips), by use of the same equipment that is commonly used to deposit HMDS for enhancing the adhesion of photoresist." (JX-1 at 9:28-32.)

Notably, the specification does not define "sawing," or provide any limitation on the meaning of the term "sawing." There is no discussion of how the "sawing" is accomplished, or what methods of "sawing" are acceptable.

During prosecution, the examiner relied on an obviousness combination of U.S. Patent 6,265,026 ("Wang") and U.S. Patent No. 5,694,740 ("Martin").[6] The applicant argued that Wang disclosed a single device instead of the "wafer having a plurality of microelectromechanical devices" as recited in the claims. In responding to the Office Action, the applicant stated that:

> The Applicant agrees with the Examiner's statement in item 4 that Wang "lacks singulating the MEM by sawing after depositing the coating." This is true, however, because <u>there would be no need for Wang to divide up his "wafer" into smaller units</u>. It is already at finished size. Thus, Wang teaches away from being combined with <u>any</u> reference that discloses sawing a wafer with a plurality of MEMs.

(JX-3 at ANALOG00006452) (Emphasis in original).

The applicant further argued that Martin disclosed application of an anti-stiction treatment on dies that were "already singulated and mounted," instead of treating wafers as required by the claims. (JX-3 at ANALOG00006453.) The applicant summarized his argument by stating:

[6] U.S. Patent No. 5,694,740 is also referred to as "the '740 patent" in this Initial Determination.

> In summary, the Applicant submits that there is no motivation in either reference for combining Wang with Martin et al. ('740) as there would be no need for Wang to divide up his "wafer" into smaller units and as Martin et al. teach coating after singulation [*sic*], as argued above.

(*Id.*) (Emphasis in original).

While asserted claims 12, 15, 31, 32, 34, 35, 38, and 39 of the '614 patent and asserted claim 1 of the '942 patent use the term "sawing," asserted claim 2 of the '942 patent uses the term "separating." Claim 2 requires: "separating said plurality of microelectromechanical devices on said treated wafer into discrete devices, wherein said depositing step is carried out before said separating step." Thus, while many of the asserted claims refer to "sawing" a wafer to form a plurality of MEMS devices, claim 2 refers to "separating" a wafer to form a plurality of MEMS devices.

"When different words or phrases are used in separate claims, a difference in meaning is presumed." *Nystrom v. Trex Co.*, 424 F.3d 1136, 1143 (Fed. Cir. 2005). The Federal Circuit explained how that presumption may be overcome:

> However, simply noting the difference in the use of claim language does not end the matter. Different terms or phrases in separate claims may be construed to cover the same subject matter where the written description and prosecution history indicate that such a reading of the terms or phrases is proper.

Id.

Here, I find that there is no evidence to suggest that "sawing" and "separating" should be understood to mean the same thing. As described *supra*, there is very little in the intrinsic record that describes the singulation of the wafer. The brief mentions of separating, cutting, dividing and sawing quoted above are not sufficient to overcome the presumption that the patentee intended for "sawing" and "separating" to have different meanings.

I find that "separating" is a broader term allowing for separation of the wafer into MEMS

devices by any means, while "sawing" is a narrower term requiring that the wafer is separated through some form of cutting. While I find that "sawing" is narrower than "separating," I do not concur with Respondents' attempt to further limit "sawing" to "mechanically cutting with a blade such as a diamond wafer saw." Analog relies on expert testimony from both sides to support its assertion that "sawing" is synonymous with "separating." (*See, e.g.,* Tr. at 479:5-13, 614:25-615:3; CX-158C at Q. 171-172.) That testimony does not overcome the fact that the patentee chose to use "sawing" and "separating" in different claims when describing the singulation of the wafers. *Network Commerce, Inc. v. Microsoft Corp.*, 422 F.3d 1353, 1361 (Fed. Cir. 2005) ("[E]xpert testimony at odds with the intrinsic evidence must be disregarded.")

Respondents offer extrinsic evidence that they claim supports a construction requiring the use of a mechanical blade. Respondents rely on an extrinsic reference that distinguishes between "laser scribing," "diamond scribing," and "diamond-wheel sawing." (RX-641 at 176-177; *see also* Tr. at 288:7-23.) Respondents also rely on the testimony of Dr. Ashurst, who was asked "[w]hat is your understanding of the term 'sawing?'" Dr. Ashurst opined that "[t]he sawing category of separation ***would include*** the conventional concept of sawing, (i.e. with a rotating diamond encrusted blade) employed in a number of different techniques with a number of different MEMS protection strategies." (RX-203C at Q. 101) (emphasis added).

I find that Respondents' extrinsic evidence does not require the use of a mechanical blade. The extrinsic reference cited by Respondents refers to "diamond-wheel sawing," but does not clearly state that all "sawing" is accomplished with a mechanical blade. (RX-641 at 176-177.) There is nothing evident in the intrinsic record that demonstrates that the inventor intended to limit "sawing" to sawing with a mechanical blade. There is no mention of a mechanical blade in the patent or prosecution history. All indications from the intrinsic evidence point to the fact

that the inventor did not intend such a restricted meaning of the term "sawing."

Dr. Ashurst's direct testimony on the issue merely states that sawing "would include" the conventional concept of using a mechanical blade. (RX-203C at Q. 101.) Such testimony does not limit "sawing" to require the use of a mechanical blade; his testimony allows for "sawing" to also encompass other methods of singulation that are not performed with a mechanical blade.

Respondents also allege that adopting Analog's construction will allow the claims to cover technology that was not in existence at the time the patents were filed. Such a concern is without merit, as the Federal Circuit has made clear that after-arising technology can be covered by claims both under literal infringement and the doctrine of equivalents. *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1371-1372 (Fed. Cir. 2008) ("Our case law allows for after-arising technology to be captured within the literal scope of valid claims that are drafted broadly enough."); *Welker Bearing Co. v. PHD, Inc.*, 550 F.3d 1090, 1099-1100 (Fed. Cir. 2008) (explaining that the doctrine of equivalents can capture after-arising technology).

Based on the foregoing, I find that "sawing" means "cutting."

4. "Oven"

The term "oven" appears in asserted claims 12, 15, 31, and 32 of the '614 patent and asserted claim 1 of the '942 patent.

Analog's Position: Analog contends that "oven" means "a system that includes a heated chamber."

Analog asserts that the parties' dispute regarding "oven" concerns Figure 4 of the patents. Analog notes that the patents describe Figure 4 as follows: "FIG. 4 shows a schematic view of an oven used for vapor deposition of a liquid anti-stiction agent." (Citing JX-1 at 2:12-13.) Analog states that the patents also refer to Figure 4 as depicting a "modified vapor prime oven."

(Citing JX-1 at 8:7-9.) Analog asserts that the modifications are heaters (labeled with the number 6 in Figure 4) located on the reservoir containing the liquid anti-stiction agent and the delivery line that connects the reservoir to the deposition chamber. (Citing CX-157C at Q. 77; Tr. at 620:22-621:2.) Analog notes that the '740 patent, which is incorporated by reference, also discloses the same modified vapor prime oven. (Citing JX-34 at 2:36-37, 4:56-60.)

Analog argues that Respondents' proposed construction ("a chamber used for heating") is incorrect. Analog claims that there is no ambiguity in the description of Figure 4, which refers to a single oven. (Citing JX-1 at 2:12-13; JX-34 at 2:36-37.) Under Respondents' proposed construction, Analog claims that Figure 4 depicts two ovens. (Citing Tr. at 623:1-4.)

Analog argues that the "oven" in the center of Figure 4 (i.e. the deposition chamber) would have no modifications under Respondents' proposed construction. According to Analog, Figure 4 is referred to as a "modified vapor prime oven" because of the heaters on the reservoir and the delivery line. (Citing CX-157C at Q. 77; Tr. at 620:22-621:2.) Analog asserts that no such heaters are located in the deposition chamber.

Analog notes that the patents state that the "oven" in Figure 4 may also contain "a device (such as a computer) for programming the temperature, gas, pressure, etc of the oven." (Citing JX-1 at 8:16-18.) Analog asserts that this supports its proposed construction and the notion that the "oven" is a system, rather than the individual heated chambers within that system. Analog argues that under Respondents' proposed construction, the computer must be located inside of a heated chamber, which is not physically possible. (Citing CX-158C at Q. 160.)

Analog points to additional language in the specification that it claims equates the oven to a "system," which Analog argues supports its proposed construction. (Citing JX-1 at 8:47-51.) Analog states that the same language from the specification cannot be reconciled with

Respondents' proposed construction because the claim language explains that the anti-stiction compound and the wafer are heated in the same oven.

Analog argues that Respondents' proposed construction of "oven" excludes the Figure 4 embodiment from many of the claims and renders the terms "oven" and "furnace" redundant. Analog states that Dr. Ashurst agrees that "oven" and "furnace" are not redundant terms as used in the asserted claims. (Citing Tr. at 618:14-18, 619:4-8, 619:19-23.) According to Analog, Respondents' proposed construction excludes the Figure 4 embodiment from all claims that require heating the anti-stiction compound within the same oven or furnace that contains the wafers (e.g., claims 15 and 32 in the '614 patent and claim 1 in the '942 patent). Analog claims that under Respondents' construction, the anti-stiction compound would be heated in one oven – the reservoir – while the wafer would be heated in the another oven – the deposition chambers. (Citing Tr. at. 623:1-4.)

Analog claims that Respondents rely on two statements in the specification that distinguish the reservoir from the "oven." (Citing JX-1 at 8:11-16, 9:36-39.) Analog claims that in those two statements, the term "oven" is being used to distinguish the deposition chamber from the rest of the system, much like the term "grill" can be used to refer to both a system and a component of that system. (Citing Tr. at 239:14-240:17.) Analog notes that ideally the language would be more precise and use the word "chamber" instead of "oven," as is done in the '740 patent. (Citing JX-34 at 4:59-60.) But when all of the evidence is considered in context, Analog argues that the construction it proposes is the correct construction.

In its reply brief, Analog notes that Dr. Ashurst admitted that one of ordinary skill in the art would understand Figure 4 to depict a single oven. (citing Tr. at 622:5-14.) Analog argues that Respondents are wrong to claim that Analog's proposed construction renders certain claim

language superfluous. Analog notes that while certain claims require that the anti-stiction compound be heated "within said oven or furnace," the presence (or absence) of this limitation is due to the fact that Analog's patents are not limited to the embodiments of Figures 4 and 5. For example, Analog states that a potential infringer could heat a compound at a remote source and transport the vapor of that compound to an "oven" containing the wafers.

Respondents' Position: Respondents contend that "oven" means "a chamber used for heating."

Respondents argue that in Figure 4, the reference number 1, which identifies the "modified vapor prime oven," points directly to the centrally located chamber. (Citing JX-1 at Fig. 4.) Respondents state that under Patent Office procedure, the reference arrow used to point to the "oven" does not include the entire system shown in Figure 4, as claimed by Analog. (Citing 37 CFR 1.84(r).) Respondents point to passages in the specification that distinguish the reservoir from the oven, arguing that the language demonstrates that the reservoir cannot be considered part of the "oven." (Citing JX-1 at 8:7-16; RX-203C at Q. 60.) Respondents cite additional language from the specification that they claim distinguishes the reservoir from the oven. (Citing JX-1 at 9:33-39; RX-203C at Q. 63.)

Respondents note that there are different claims that are directed to the different embodiments shown in Figures 4 and 5. According to Respondents, the claims that require "heating a compound having anti-stiction properties within said oven or furnace" are shown in the embodiment of Figure 5, while the other claims that do not have such a limitation would be shown in Figure 4. (Citing RX-203C at Q. 64; Tr. at 354:24-256:24.)

Respondents assert that a person of ordinary skill in the art would have known that the function of an oven is to heat the contents therein uniformly to a given temperature, although that

temperature can vary over time. (Citing RX-203C at Q. 69.) Respondents claim that it is unconventional and technically undesirable to describe an apparatus that incorporates multiple volumes of space at different temperatures, concurrently, as "an oven." (*Id.*) Respondents note that Webster's dictionary defines an "oven" as "[a] chamber used for baking, heating or drying." (Citing RX-259.)

Respondents argue that Analog misrepresents the disclosures of the '740 patent in support of its construction. Respondents assert that the object labeled in Figure 4 of the '740 patent as a "chamber" is labeled as an "oven" in the '614 patent. (Citing Tr. at 278:8-17; RDX-12.) Respondents claim that it is the usage in the '614 patent that defines how the claims must be construed.

In their reply brief, Respondents state that Analog's expert admits that the specification is not explicit as to what is meant by "oven" and agrees that "oven" has two meanings in the context of the patents-in-suit. Respondents claim that Analog also acknowledges the dual meanings of "oven" in the specification. (Citing Tr. at 55:2-5, 56:6-57:14.) Respondents argue that when there is an equal choice between a broader and a narrower meaning of a claim term, the narrower meaning should be adopted. (Citing *Athletic Alternatives, Inc. v. Prince Mfg., Inc.*, 73 F.3d 1573, 1581 (Fed. Cir. 1996).)

Respondents argue that the fact that Figure 4 is described as "an oven" does not mean that Analog's construction is correct. Respondents criticize Analog's use of inventor testimony regarding the modifications to the oven, asserting that claim construction testimony from an inventor is of little probative value. Respondents point to Dr. Ashurst's testimony and say that it shows that one of ordinary skill in the art would refer to a modified vapor prime oven as a system, whereas an oven is merely a chamber used for heating and not a system. (Citing Tr. at

622:5-14; RX-203C at Q. 58.)

Respondents argue that the modifications are not restricted to the heaters on the reservoir. Pointing to the language of the specification, Respondents assert that the patents do not restrict the modifications only to the heaters on the reservoir. (Citing JX-1 at 9:52-55, 9:33-36.)

Staff's Position: Staff contends that "oven" means "a system that includes a heated chamber."

Staff notes that Dr. Ashurst admitted that one of ordinary skill in the art would view Figure 4 as disclosing only one oven, which includes the entire system. (Citing Tr. at 622:5-8.) Staff argues that the intrinsic evidence supports a construction of "oven" that encompasses the entire system that contains a heating chamber. (Citing JX-1 at 2:12-14.)

Staff points to Dr. Miller's testimony that the specification's two uses of "oven" are reconcilable. (Citing Tr. at 239:14-240:17.) Staff claims that the '740 patent, which is considered intrinsic evidence, shows that oven as the entire system. (Citing JX-34 at 4:59.)

Construction to be applied: "a chamber used for heating."

Asserted claims 12, 15, 31, and 32 of the '614 patent and asserted claim 1 of the '942 patent require inserting a wafer "into one of an oven or a furnace." Asserted claim 15 of the '614 patent and asserted claim 1 of the '942 patent further require heating a compound having anti-stiction properties "within said oven or furnace," while asserted claim 32 of the '614 patent requires heating a compound having anti-stiction properties "within said oven." Other asserted claims, such as claim 12 of the '614 patent, require heating a compound having anti-stiction properties, but do not require that the compound is heated within the oven or furnace.

Figure 4 of the patents-in-suit depicts "a schematic view of an oven used for vapor deposition of a liquid anti-stiction agent." (JX-1 at 2:12-13.) Figure 4 shows the following:

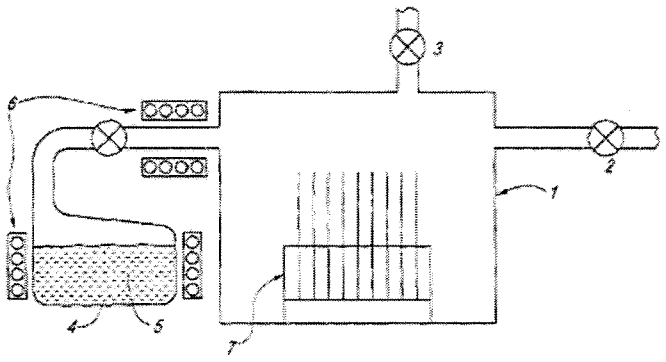


FIG. 4

(JX-1 at Fig. 4.) Figure 4 is described in the specification:

> Two variations of ovens used to heat the treated wafers are shown in FIGS. 4 and 5. The Modified Vapor Prime Oven 1 (FIG. 4) is capable of drawing a vacuum (through vacuum valve 2, which is connected to a vacuum pump. Nitrogen or some other relatively inert gas can be fed into the oven via gas inlet valve 3. The oven also has connected thereto a reservoir 4 containing the coating material 5, which can be a liquid or solid at room temperature, and the reservoir may have one or more heat sources 6 to vaporize the coating material and to maintain it in vapor form in its passage from the reservoir to the oven. The Oven can also contain a device (such as a computer) for programming the temperature, gas pressure, etc. of the oven. The oven in FIG. 4 is shown with wafers positioned in a wafer boat 7.

(*Id.* at 8:6-19.) Figure 5 depicts a furnace where the anti-stiction compound and the wafers are both contained in the same enclosure:

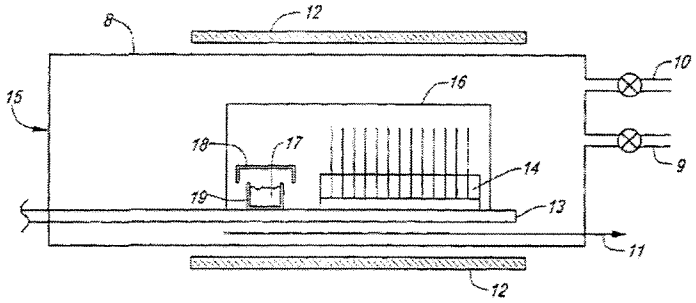


FIG. 5

(JX-1 at Fig. 5.) The specification explains:

> A typical CVD furnace 8 is shown in FIG. 5. This furnace also has a vacuum source 9, a source of nitrogen or another relatively inert gas 10, a thermocouple

> 11, one or more heaters 12, and a stand 13, for supporting the materials to be treated. This stand is often called a paddle. The wafers in wafer boats 14 are placed in enclosure 16, which is not vacuum-tight, and covered. The paddle holding enclosure 16 is then advanced through door 15, which is then closed. Enclosure 16 is used to maintain a high localized concentration of vapor. Note that the coating material 17 is placed in a container 19, which is also within the enclosure, said container shown with a shield 18 to suppress splattering.

(*Id.* at 8:20-31.)

The specification explains that "[t]he temperature to which the oven is heated is important, since the temperature must be hot enough to vaporize the organo silicon compound but not so hot that any component of the system or the wafer that is being treated will be damaged." (JX-1 at 8:47-51.) Finally, in discussing HMDS, the specification states that:

> This equipment is a vacuum oven, typically heated to 220°-250°C., with a reservoir that holds HMDS, which is a liquid at room temperature (FIG. 4 illustrates a modified form of such an oven). HMDS has an appreciable vapor pressure at room temperature so, when a valve that isolates the reservoir from the oven is opened, HMDS vapor flows into the oven and reacts with the hot wafer surfaces.

(*Id.* at 9:33-39.)

The parties dispute whether or not the "oven" of Figure 4 is comprised of the entire system shown in the figure, or the heated chamber that holds the wafers. The dispute is the result of the inexact use of the term "oven" throughout the specification. As described *supra*, the specification could be viewed to both describe the entire system of Figure 4 as an "oven," and the chamber holding the wafers as an "oven."

I find that "oven" means "a chamber used for heating,"[7] and that the entire system of Figure 4 is not the "oven." The "oven" in Figure 4 is identified with the reference number 1. The arrow from the reference number 1 points directly to the chamber holding the wafers. This is consistent with Patent Office procedure, as the rules state that "a freestanding arrow [is used]

[7] The adopted construction of "oven" is consistent with the plain and ordinary meaning of the term, which is "a chamber used for baking, heating, or drying." (RX-259)

to indicate the entire section towards which it points," while "an arrow touching a line [is used] to indicate the surface shown by the line looking along the direction of the arrow." 37 CFR § 1.84(r).

The most persuasive evidence regarding what constitutes an "oven" is the description of the various components attached to the chamber in Figure 4. The specification makes clear that vacuum pump and a container holding an inert gas are both connected to the "oven." (JX-1 at 8:6-19.) In addition, a heated reservoir is connected to the "oven" to supply the coating material. (*Id.*) These passages indicate that these components are separate from the "oven." Figure 4 shows that each component is connected to the "oven" through a valve, depicted as an "X" surrounded by a circle. (*Id.* at 8:6-19, Fig. 4.) When discussing HMDS, the specification is clear to distinguish the "oven" from the reservoir. (*Id.* at 9:33-39.) In light of these statements, it would be illogical to consider the reservoir, vacuum pump and inert gas container as part of the "oven."

Moreover, the adopted construction is consistent with the claims of the '614 and '942 patents, and ensures that each of the embodiments shown in Figures 4 and 5 are covered by certain claims. Some claims, such as asserted claims 15 and 32 of the '614 patent and asserted claim 1 of the '942 patent, require that the anti-stiction compound is heated within the oven or furnace. Such a configuration is clearly shown in Figure 5. (*See* JX-1 at 8:20-31, Fig. 5.) Other claims, such as asserted claim 12 of the '614 patent, do not require that the anti-stiction compound is heated within the oven or furnace, and that configuration is shown in, *inter alia*, Figure 4.[8]

Even if the intrinsic evidence could be described as depicting an equal choice between

[8] The claims use the terms "oven" and "furnace," often requiring insertion of a wafer "into one of an oven or a furnace." The specification makes clear that the CVD furnace shown in Figure 5 may also be referred to as an "oven." (*See* JX-1 at 8:6-7 ("Two variations of ovens used to heat the treated wafers are shown in FIGS. 4 and 5."))

the broader meaning of "oven" advocated by Analog, and the narrower meaning of "oven" advocated by Respondents, Federal Circuit case law would still compel construing the term according to the narrower meaning. As the court explained in *Athletic Alternatives, Inc. v. Prince Mfg., Inc.*,

> ***Where there is an equal choice between a broader and a narrower meaning of a claim***, and there is an enabling disclosure that indicates that the applicant is at least entitled to a claim having the narrower meaning, ***we consider the notice function of the claim to be best served by adopting the narrower meaning.***

73 F.3d 1573, 1581 (Fed. Cir. 1996) (emphasis added).

Analog argues that adopting Respondents' proposed construction would mean that the embodiment in Figure 4 would be excluded from the claims that require the anti-stiction compound to be heated within the oven or furnace. There is nothing wrong with such a result as "[i]t is not necessary that each claim read on every embodiment." *Baran v. Med. Device Techs.*, Inc., 616 F.3d 1309, 1316 (Fed. Cir. 2010). As described *supra*, there are claims that cover both the embodiments of Figure 4 and Figure 5 under Respondents' proposed construction of "oven."

Analog argues that Respondents' proposed construction is contrary to the '740 patent, which is incorporated by reference in the asserted patents. The '740 patent includes the following figure:

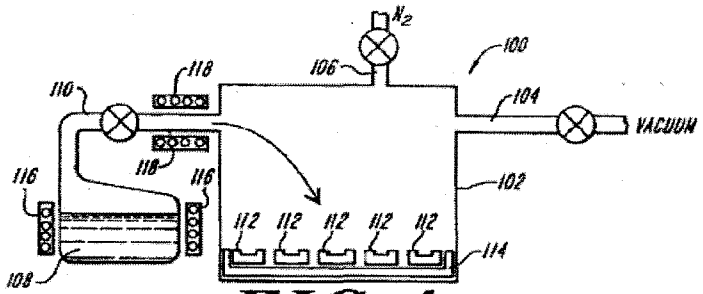


FIG. 4

(JX-34 at Fig. 4.)

The reference number 100 refers to an "oven," while reference number 102 refers to a

"chamber." (JX-34 at 4:56-60.) Analog argues that this figure demonstrates that the entire system is the "oven," while the "chamber" is just one component of the oven. While this figure looks similar to Figure 4 in the '614 and '942 patents, it is clearly labeled differently. The reference number and line used to identify the "chamber" in the '740 patent actually identifies the "oven" in the '614 and '942 patents. Because I am construing the meaning of "oven" in the '614 and '942 patents, I focus on Figure 4 in the '614 and '942 patents. The slightly different Figure 4 of the '740 patent cannot change or overcome the content of the '614 and '942 patents. Moreover, the '740 patent is prior art, and does not dictate the scope of the inventions disclosed and claimed in the '614 and '942 patent.

Analog argues that the fact that the specification states that the oven may contain a computer for programming supports Analog's proposed construction. Analog argues that under Respondents' proposed construction, the computer must be located inside of a heated chamber. Analog asserts that this is physically impossible because the computer could not withstand the heat of the oven and would be impossible to access while the oven is in use. (*See* CIB at 33.) Analog's argument relies on unsupported expert testimony from Dr. Miller. (CX-158C at Q. 160.) I find that Dr. Miller's conclusory testimony is insufficient to demonstrate that Analog's assertion is correct. *Phillips*, 415 F.3d at 1318 (stating that "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court.")

As decribed *supra*, the parties rely on extrinsic evidence in the form of inventor testimony and expert testimony regard the meaning of "oven." I find that such testimony carries little to no weight and is unnecessary in light of the evidence discussed *supra*. *Phillips*, 415 F.3d at 1318 (explaining that "extrinsic evidence consisting of expert reports and testimony is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not

present in intrinsic evidence."); *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1370 n. 5 (Fed. Cir. 2003) ("[T]his court has often repeated that inventor testimony is of little probative value for purposes of claim construction.")

5. "Substantially at Room Temperature"

The phrase "substantially at room temperature" appears in asserted claim 34 in the '614 patent.

Analog's Position: Analog contends that no construction is needed for this phrase. Analog asserts that the patents provide no special meaning for "substantially at room temperature." (Citing Tr. at 627:5-9.)

Analog claims that Respondents' proposed construction equates "substantially at room temperature" to "room temperature." According to Analog, this would render the term "substantially" meaningless. Analog asserts that Dr. Ashurst's testimony regarding the phrase is at odds with Respondents' proposed construction that requires 20°-25°C. (Citing 627:19-628:6, 628:14-629:6.)

In its reply brief, Analog notes that Respondents now argue for the first time in their initial post-trial brief that the term "substantially at room temperature" should be construed to deviate from room temperature by only one degree. (Citing RIB at 21.) Analog claims that Respondents base this argument on the fact that the variation in Knowles' equipment are not greater than one degree Celsius. (*Id.*) Analog argues that this is a blatantly self-serving claim construction intended to allow Respondents to avoid infringement.

Analog states that Dr. Ashurst testified that the meaning of "substantially at room temperature" depends on the context in which it is used. (Citing Tr. at 626:11-23.) Analog argues that Dr. Ashurst then conceded that ambient temperatures in a standard fabrication facility

may be "substantially beyond" 25 degrees Celsius. (Citing Tr. at 628:14-629:6.) According to Analog, Respondents' proposed construction cannot be reconciled with Dr. Ashurst's testimony.

Respondents' Position: Respondents contend that "room temperature" means a temperature in the range of 20°-25°C, and that "substantially at room temperature" means "a temperature in the range described by 'room temperature.'"

Respondents assert that "room temperature" and "substantially at room temperature" are not defined, and are not even supported, in the intrinsic record. According to Respondents, "room temperature" is a well-known reference point, and is consistently in the range of 20°-25°C. (Citing RX-212; RX-262.) Respondents claim that other cases have construed "room temperature" in a consistent manner.

Respondents state that Analog's expert fails to offer any support for his opinion that one of ordinary skill in the art would read the "substantially at room temperature" limitation any broader than the 20°-25°C range. (Citing CX-158C at Q. 178; CX-239C at Q. 117.) Respondents claim that Analog believes that 35 degrees Celsius is "substantially at room temperature." Respondents state that Analog's expert justifies his position by comparing such a temperature to the high temperatures discussed in the patents. (Citing CX-239C at Q. 118.) Respondents argue that there is no basis to use the high temperatures disclosed in the patents as an indication of what constitutes a "substantial" variation.

Respondents state that in the equipment used by Knowles, there is a variation of no more than one degree Celsius. (Citing Tr. at 140:24-141:2.) Respondents claim that the nature of manufacturing MEMS wafers requires that the temperature is strictly controlled. (Citing RX-203C at Q. 89-92; Tr. at 141:24-142:20.) Respondents assert that Knowles' process would not work at room temperature because the anti-stiction agent would impermissibly condense on the

walls of the reaction chamber. (Citing Tr. at 113:10-114:6.) Respondents argue that to the extent that "substantially" is determined to connote a range beyond what is understood by "room temperature," the deviation should be limited by 1 degree Celsius, making "substantially at room temperature" equal to 19°-26°C.

In their reply brief, Respondents state that by failing to offer a construction before the applicable deadlines, Analog and Staff have waived their right to argue for a construction in the post-hearing briefing. Respondents claim that simply stating that no construction is necessary is not a proper claim construction.

Respondents argue that Analog fails to identify how one of ordinary skill in the art would determine whether or not a temperature was "substantially at room temperature." According to Respondents, Analog's position relies on a person's subjective opinion and renders the term indefinite. Respondents further claim that Analog's position subverts the public notice function of the claims.

Respondents argue that Analog is wrong to claim that Respondents seek to read out the term "substantially." Respondents assert that "substantially" is a term of approximation, and that one of ordinary skill in the art would read "substantially" to allow a 1 degree Celsius variation of the room temperature.

Staff's Position: Staff contends that a proper construction of "substantially at room temperature" includes temperatures that are meaningfully close to a temperature range that one of ordinary skill in the art would consider room temperature.

Staff does not agree with Respondents' construction, as Staff believes that Respondents seek to render the term "substantially" meaningless. (Citing RPHB at 28.) Staff asserts that Respondents' expert even admits that one of ordinary skill in the art would understand that there

is a difference between "room temperature," a temperature a "little" beyond room temperature, and a temperature "substantially" below room temperature. (Citing Tr. at 628:14-629:4.)

Staff notes that Analog contends that one of ordinary skill in the art would understand that the term "room temperature" includes temperatures outside of the range of 20°-25°C. Staff states that Analog's expert testified that the term "substantially" means some range outside of the range understood to be room temperature. (Citing CX-158C at Q. 178.)

In its reply, Staff states that Dr. Ashurst's testimony on cross-examination contradicts Respondents' position. Specifically, Staff claims that Dr. Ashurst testified that the term "substantially" allows for the temperature range to go outside of the range understood to be room temperature, but that it depended on the context and that context would be the temperature in a fabrication facility. (Citing Tr. at 626:12-629:6.) Staff argues that if the phrase is construed, it should be construed to mean a ranger near the range of 20°-25°C that may include temperatures substantially beyond 25°C, and certainly include 35°C.

Construction to be applied: "a temperature in the range of approximately 20°-25°C."

Claim 34 of the '614 patent recites, *inter alia*, "[a] method for imparting anti-stiction properties to microelectromechanical devices derived from a wafer comprising the steps of: exposing said wafer, ***substantially at room temperature***, to the vapor of a compound having anti-stiction properties…" (JX-1 at 22:1-6) (emphasis added).

The specification uses the term "room temperature" multiple times, but does not provide any insight into the meaning of the term. (*See, e.g.,* JX-1 at 7:49-52, 8:11-16, 9:19-21, 9:36-39, 9:55-57.) The specification also does not explain how "substantially at room temperature" differs from "room temperature." (*See generally id.*) The prosecution history of the '614 patent does not include any evidence regarding the meaning of "substantially at room temperature."

(JX-3.) Thus, I find it appropriate to consider extrinsic evidence offered by the parties. *Tegal Corp. v. Tokyo Electron Am., Inc.*, 257 F.3d 1331, 1342 (Fed. Cir. 2001) (noting that consideration of extrinsic evidence is proper if the intrinsic evidence is ambiguous regarding the meaning of a claim term); *Digital Biometrics, Inc. v. Identix, Inc.*, 149 F.3d 1335, 1344 (Fed. Cir. 1998) ("[I]f after consideration of the intrinsic evidence there remains doubt as to the exact meaning of the claim terms, consideration of extrinsic evidence may be necessary to determine the proper construction.")

There is a well-understood ordinary meaning for the term "room temperature," as evidenced by dictionary definitions. Respondents offer a definition of "room temperature" from HAWLEY'S CONDENSED CHEMICAL DICTIONARY (14th ed.) that reads: "[a]n ambient temperature from 20 to 25C (68-77F)." (RX-212.) Respondents also offer a definition of "room temperature" from the AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (4th ed. 2000), which reads: "[a]n indoor temperature of from 20 to 25°C (68 to 77°F)." (RX-262.) Because the intrinsic evidence does not provide any special meaning for the term "room temperature," I find that the term means 20-25°C. *See Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1347 (Fed. Cir. 2009) (explaining that "courts may 'rely on dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents.'") (citation omitted).

It is clear that "substantially at room temperature" must have a meaning distinct from "room temperature," as I must give meaning to the term "substantially." *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005) ("A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.") Respondents

argue that the term "substantially" should be construed to allow a 1°C variation, resulting in a range of 19-26°C. (CIB at 21-22.) Respondents base their 1°C variation argument on the amount of temperature deviation allowed during Knowles' process. (Tr. at 140:24-141:2.) Respondents' argument is not persuasive, as it is improper to construe the language of the claims based on the accused Knowles process. *Wilson Sporting Goods, Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1330-1331 (Fed. Cir. 2006) (explaining that "a court may not use the accused product or process as a form of extrinsic evidence to supply limitations for patent claim language.")

Neither Analog nor Staff offer an argument regarding the meaning of the term "substantially." The Federal Circuit has recognized that the word "substantially" has multiple meanings, two of which are "largely" and "essentially." *Deering Precision Instruments, L.L.C. v. Vector Distribution Sys., Inc.*, 347 F.3d 1314, 1322-1323 (Fed. Cir. 2003). The Federal Circuit has also stated that "[t]he term 'substantial' is a meaningful modifier implying 'approximate,' rather than 'perfect.'" *Liquid Dynamics Corp. v. Vaughan Co.*, 355 F.3d 1361, 1368 (Fed. Cir. 2004); *see also Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1360 (Fed. Cir. 2003) ("The term 'substantially,' as used in this context, denotes approximation.") In light of the manner in which "substantially" is used in claim 34, I find that "substantially at room temperature" means "a temperature in the range of approximately 20°-25°C."

While the adopted construction fails to provide a precise numerical limit, this is allowable under Federal Circuit precedent. In *Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1310-1311 (Fed. Cir. 2003), the court needed to construe the term "generally parallel." The court noted that words of approximation such as "generally" and "substantially" are descriptive terms commonly used to avoid a strict numerical boundary. *Id.* As the court

explained, "while ideally, all terms in a disputed claim would be definitively bounded and clear, such is rarely the case in the art of claim drafting." *Id.* at 1311. Noting that the intrinsic evidence did not provide any limitation on the meaning of "generally parallel," the court held that the term "envisions some amount of deviation from exactly parallel." *Id.* Importantly, the court's construction did not require a numerical boundary, as one was not provided in the intrinsic evidence. *See also Cordis*, 339 F.3d at 1360-1362 (refusing to place a numerical limitation on the phrase "substantially uniform thickness"). Here, because there is no intrinsic evidence requiring a numerical boundary on "substantially at room temperature," I find that it would improper to impose one.

C. The '942 Patent

1. Terms Common to Both the '614 Patent & '942 Patent

The following terms or phrases are found in both the '614 patent and '942 patent: "a compound having anti-stiction properties," "a temperature sufficient to vaporize," "sawing," and "oven." These terms have been construed in connection with the '614 patent as described in Section III.B *supra*. The parties do not argue that these terms have different meanings in the '942 patent, and I find that the meanings adopted for the '614 patent shall apply with respect to the '942 patent. This is in line with Federal Circuit law that holds that common terms in related patents should be construed consistently. *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005) ("Because NTP's patents all derive from the same parent application and share many common terms, we must interpret the claims consistently across all asserted patents."); *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003) ("[W]e presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning.")

2. "Organo-Metallic Surface"

The term "organo-metallic surface" appears in asserted claim 8 of the '942 patent.

Analog's Position: Analog contends that "organo-metallic surface" means "a surface comprised of compounds containing a metallic element and organic groups (with the metallic element bound to carbon atoms)."

Analog states that the parties disagree as to whether or not the term "organo-metallic surface" includes silicon-based surfaces. Analog claims that silicon is a metalloid, which is an intermediate category between pure metal and clearly non-metal materials. (Citing CX-158C at Q. 191; Tr. at 631:5-17.) Analog asserts that metalloids have metallic properties. (Citing Tr. at 631:18-21.)

Analog notes that Dr. Ashurst testified that it is his opinion that there is a lack of consensus in the scientific community as to whether organo silicon compounds are organo-metallic. (Citing Tr. at 632:23-633:8.) Analog argues that irrespective of Dr. Ashurst's opinion, the intrinsic evidence demonstrates that the only possible interpretation of "organo-metallic surface" is one that includes silicon-based surfaces. Analog asserts that the only compound discussed in the patents are organo silicon compounds, and that every example in the patents involves wafers with silicon surfaces. (Citing JX-1 at 7:1-3, 4:30-31.) According to Analog, the patents do not refer to any classic metals as organo-metallics. (Citing Tr. at 632:4-7.)

Respondents' Position: Respondents contend that "organo-metallic surface" means "a surface formed by a molecule including organic content and metallic content."

Respondents argue that organo-silicons should not be considered organo-metallic compounds. Respondents point to dictionary definitions that they claim prove that organo-metalloids are not organo-metallic compounds. (Citing RX-203C at Q. 117.) Respondents

identify a catalog from a company named Gelest that differentiates between organometallics and silicon compounds. (Citing RX-215; RPX-12.)

Respondents argue that if the patentee intended to include silicon compounds, it should have written the claim to read organo-silicon, as was done in claim 35 in the '614 patent. (Citing JX-1 at 35:13-14.) Alternatively, Respondents claim that the patentee could have acted as his own lexicographer and provided a specific definition for "organo-metallic" including a carbon-silicon bond, as he did for organo silicon compounds. (Citing JX-2 at 7:3-7.) Respondents assert that "organo-metallic" cannot be construed to encompass organo-silicons because the patentee specifically chose the organo-metallic limitation rather than the organo silicon language he previously used.

In their reply brief, Respondents argue that Analog is wrong to claim that every example in the patents involves wafer with silicon surfaces. (Citing CIB at 40.) Respondents note that the patents include a discussion of thin organic films being applied to aluminum and gold substrates, both classic metals. (Citing JX-2 at 15:3-6, 15:9-14, 13:50-53, 14:37-40.)

Respondents argue that considering silicon a metal would impermissibly read the "organo-metallic" limitation completely out of the claim limitation. Respondents further argue that the extrinsic evidence clearly demonstrates that "organo-metallic" should be construed to exclusion organo silicon compounds.

Staff's Position: Staff agrees with Analog's proposed construction of "organo-metallic surface." Staff asserts that Respondents' construction is legally flawed because Respondents unnecessarily rely on extrinsic evidence and fail to establish that the extrinsic evidence is contemporaneous with the filing date of the '942 patent. (Citing Tr. at 678:16-681:3.)

In its reply brief, Staff argues that dictionary definition from the Cambridge Dictionary,

attached as Appendix A to Respondents' initial post-hearing brief, should be rejected as untimely and unauthenticated. Staff states that in view of Dr. Ashurst's testimony that he did not remember the copyright date for the dictionary, Respondents' contention cannot be supported by credible evidence. (Citing Tr. at 678:16-681:3.)

Construction to be applied: "a surface comprised of compounds containing a metallic element and organic groups (with the metallic element bound to carbon atoms)."

Claim 8 of the '942 patent recites: "[t]he method of claim 2, said method resulting in an ***organo-metallic surface*** on the plurality of microelectromechanical devices." (JX-2 at 18:40-42.) The term "organo-metallic surface" does not appear in any of the other claims or in the specification. (*See generally* JX-2.)

The parties dispute whether or not a silicon-based surface constitutes an "organo-metallic surface." The parties agree that silicon is a metalloid. (CX-158C at Q. 191; Tr. at 631:5-17.) A metalloid is an intermediate category between pure metal material and clearly non-metal material. (Tr. at 631:5-17.)

Analog argues that the specification of the '942 patent only discloses silicon-based surfaces, meaning that the term "organo-metallic surface" must be construed to include silicon-based surfaces, or claim 8 will not cover any of the disclosed embodiments. As Respondents note, Analog overlooks the disclosure of vapor deposition of a thin organic coating on an aluminum alloy. (JX-2 at 15:1-20.) Moreover, the specification indicates the application of the invention beyond silicon wafers:

> ***The examples used in this application are based on polysilicon microstructures on silicon wafers. However, it is apparent that the invention is applicable to clean inorganic microstructures on any substrate.*** Therefore, the term wafer, as used in this application, includes any clean inorganic substrate that contains at least one inorganic microstructure.

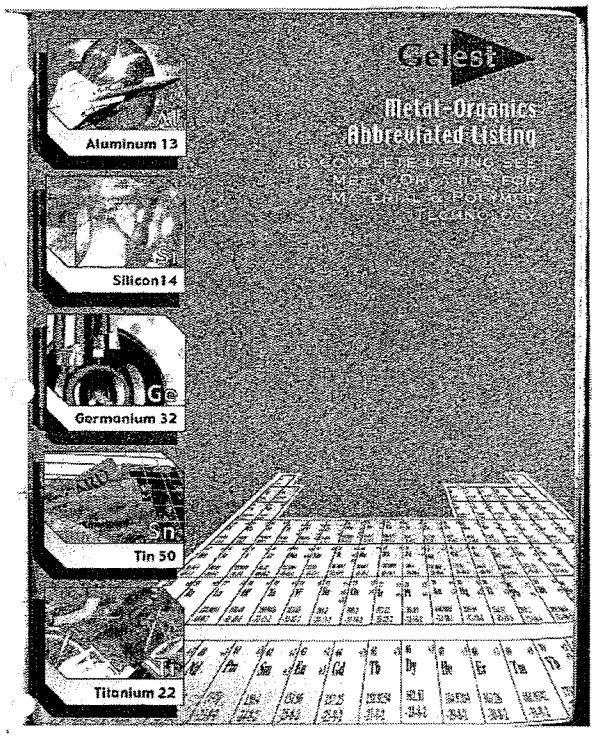
(*Id.* at 4:31-36) (emphasis added). Thus, I find that the specification is inconclusive regarding whether or not "organo-metallic surfaces" include silicon-based surfaces.

Analog cites to the testimony of Dr. Miller to support its position. Dr. Miller testified that "[s]ilicon is technically a metalloid. But one of ordinary skill in the art would know that organo-metallic chemistry includes compounds with carbon-silicon bonds." (CX-158C at Q. 191.) Dr. Miller also identified a book entitled "Organometallic Chemistry: A Unified Approach" that states that "only a few ***organometallic compounds*** like tetraethyllead and ***silicones*** have been used in bulk quantities…" (CX-65 at ANALOG00114060) (emphasis added).

Respondents cite to Dr. Ashurst's testimony to support their position. (RX-203C at Q. 117.) Dr. Ashurst's testimony constitutes a recitation of a dictionary definition and a passage from a journal that he claims supports Respondents' position. (*Id.*) The dictionary and journal cited by Dr. Ashurst are not found in evidence. Respondents instead attach a copy of the dictionary definition to their initial post-hearing brief and request that I take notice of the dictionary definition. (RIB at 116, n. 6.) Respondents offer no explanation regarding why this dictionary definition was not offered into evidence at the hearing, or why Respondents failed to request that I take notice of the dictionary definition at the hearing. Based on Respondents' lack of diligence in offering this dictionary definition, I decline to take notice of it.

Dr. Ashurst's direct testimony must be viewed in light of his testimony on cross-examination. During cross-examination, Dr. Ashurst acknowledged that there was a "lack of consensus" in the field regarding whether or not organosilicon compounds are organo-metallic. (Tr. at 632:23-633:11.) Such equivocation lessens the weight given to Dr. Ashurst's direct testimony that organo-metallic surfaces do not include silicon-based surfaces.

Respondents also rely on a catalog from a company named Gelest, Inc. (RX-215.) The catalog includes an "Abbreviated Listing" of "metal-organics." (*Id.* at p. 539.) Respondents note that there are no silicon compounds included in the abbreviated listing. (*Id.*) I find that this catalog is not conclusive evidence that silicon-based materials are not "organo-metallic" materials for at least two reasons. First, the listing of compounds is an abbreviated listing, and not intended to be an exhaustive list of every organo-metallic substance. (*Id.*) Second, the cover page for the list includes a graphic showing five elements – aluminum, silicon, germanium, tin, and titanium. (*Id.*) The cover page is shown below:



(*Id.*) At a minimum, this graphic casts doubt on Respondents' assertion that the Gelest catalog provides evidence to support Respondents' claim construction position.

Based on the foregoing, I find that the evidence relied upon by Analog is more persuasive and credible than the evidence relied upon by Respondents. The term "organo-metallic surface" is construed to mean "a surface comprised of compounds containing a metallic element and

organic groups (with the metallic element bound to carbon atoms)." The adopted construction does not exclude silicon-based surfaces.

IV. INVALIDITY

A. Applicable Law

It is the respondent's burden to prove invalidity, and the burden of proof never shifts to the patentee to prove validity. *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1380 (Fed. Cir. 2008). "Under the patent statutes, a patent enjoys a presumption of validity, *see* 35 U.S.C. § 282, which can be overcome only through facts supported by clear and convincing evidence[.]" *SRAM Corp. v. AD-II Eng'g, Inc.*, 465 F.3d 1351, 1357 (Fed. Cir. 2006).

The clear and convincing evidence standard placed on the party asserting the invalidity defense requires a level of proof beyond the preponderance of the evidence. Although not susceptible to precise definition, "clear and convincing" evidence has been described as evidence which produces in the mind of the trier of fact "an abiding conviction that the truth of a factual contention is 'highly probable.'" *Price v. Symsek*, 988 F.2d 1187, 1191 (Fed. Cir. 1993) (citing *Buildex, Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed.Cir.1988).)

1. Anticipation

"A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention. Moreover, a prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference." *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (citations omitted).

"When no prior art other than that which was considered by the PTO examiner is relied

on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984). Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1467 (Fed.Cir.1990).

2. Obviousness

Section 103 of the Patent Act states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. § 103(a) (2008).

"Obviousness is a question of law based on underlying questions of fact." *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1379 (Fed. Cir. 2008). The underlying factual determinations include: "(1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art, and (4) objective indicia of non-obviousness." *Id.* (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). These factual determinations are often referred to as the "*Graham* factors."

"When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co.*, 725 F.2d at 1359. Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co.*, 909 F.2d

at 1467.

The critical inquiry in determining the differences between the claimed invention and the prior art is whether there is a reason to combine the prior art references. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417-418 (2007). In *KSR*, the Supreme Court rejected the Federal Circuit's rigid application of the teaching-suggestion-motivation test. The Court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 418. The Court described a more flexible analysis:

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue...As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

Id.

Since *KSR* was decided, the Federal Circuit has announced that, where a patent challenger contends that a patent is invalid for obviousness based on a combination of prior art references, "the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, . . . and would have had a reasonable expectation of success in doing so." *PharmaStem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007).

In addition to demonstrating that a reason exists to combine prior art references, the challenger must demonstrate that the combination of prior art references discloses all of the limitations of the claims. *Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1373-1374

(Fed. Cir. 2010) (upholding finding of non-obviousness based on the fact that there was substantial evidence that the asserted combination of references failed to disclose a claim limitation); *Velander v. Garner*, 348 F.3d 1359, 1363 (Fed. Cir. 2003) (explaining that a requirement for a finding of obviousness is that "all the elements of an invention are found in a combination of prior art references").

3. Section 112

The first paragraph of 35 U.S.C. § 112 states:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The first paragraph of § 112 contains three separate requirements: enablement, written description,[9] and best mode. *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 921 (Fed. Cir. 2004) (describing the "[t]hree separate requirements" of § 112, ¶ 1); *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 452 (Fed. Cir. 1985) (stating that § 112, ¶ 1 "requires that the inventor adequately disclose three separate items").

The first requirement is enablement. The Federal Circuit has found that the enablement requirement is satisfied when the inventor provides sufficient information about the claimed invention so that one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation. *AK Steel Corp. v. Sollac and Ugine*, 344 F.3d 1234, 1243-1244 (Fed. Cir. 2003); *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008); *In re Wands*, 858 F.2d 731, 736-737 (Fed. Cir. 1988). Enablement is determined from the viewpoint of persons of ordinary skill in the field of the invention at the time the patent

[9] The Federal Circuit recently reaffirmed in an *en banc* decision that § 112, ¶ 1 contains a written description requirement separate from the enablement requirement. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1340 (Fed. Cir. 2010) (*en banc*).

application was filed. *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000).

The second requirement is written description. The Federal Circuit has interpreted 35 U.S.C. § 112, ¶ 1, to require the patent specification to "describe the claimed invention so that one skilled in the art can recognize what is claimed." *Enzo Biochem, Inc. v. Gen-Probe Inc.,* 323 F.3d 956, 968 (Fed.Cir.2002). In evaluating whether a patentee has fulfilled this requirement, the standard is that the patent's "disclosure must allow one skilled in the art 'to visualize or recognize the identity of' the subject matter purportedly described." *Id.* (quoting *Regents of Univ. of Cal. v. Eli Lilly & Co.,* 119 F.3d 1559, 1573 (Fed.Cir.1997)); *see also Cordis Corp. v. Medtronic Ave, Inc.,* 339 F.3d 1352, 1364 (Fed. Cir. 2003).

Terms need not be used *in haec verba. Eiselstein v. Frank,* 52 F.3d 1035, 1038 (Fed.Cir.1995). The written description requirement can be satisfied by "words, structures, figures, diagrams, formulas, etc." *Lockwood v. Am. Airlines, Inc.,* 107 F.3d 1565, 1572 (Fed.Cir.1997).

The third requirement is best mode. "The purpose of the best mode requirement is to restrain inventors from applying for patents while at the same time concealing from the public preferred embodiments of the inventions they have in fact conceived." *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1330 (Fed. Cir. 2002). A holding of invalidity for failure to disclose the best mode requires clear and convincing evidence that the inventor both knew of and concealed a better mode of carrying out the claimed invention than was set forth in the specification. *Transco Prods., Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 560 (Fed. Cir. 1994) (citing *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1578 (Fed.Cir.1991).)

The indefiniteness requirement arises out of the second paragraph of § 112, which states: "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. § 112, ¶ 2 (2009). As explained by the Federal Circuit, "[t]his requirement serves a public notice function, ensuring that the patent specification adequately notifies the public of the scope of the patentee's right to exclude." *Praxair, Inc. v. ATMI, Inc.*, 543 F.3d 1306, 1319 (Fed. Cir. 2008). "If one skilled in the art would understand the bounds of the claim when read in light of the specification, then the claim satisfies section 112 paragraph 2." *Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001). The Federal Circuit has provided the following guidance in determining whether a claim is indefinite:

> If a claim is insolubly ambiguous, and no narrowing construction can properly be adopted, we have held the claim indefinite. If the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds.

Id.; *see also Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1342 (Fed. Cir. 2003) (characterizing the indefiniteness standard as "somewhat high.")

B. The '614 Patent

1. Best Mode

Respondents' Position: Respondents contend that the '614 patent is invalid for failure to disclose the best mode.

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Analog's Position: Analog contends that the '614 patent is not invalid for failure to disclose the best mode.

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Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence of a best mode violation.

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Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the '614 patent is invalid for failure to satisfy the best mode requirement.

"To satisfy the best mode requirement, an inventor must disclose the preferred embodiment of his invention as well as preferences that materially affect the properties of the invention." *Ajinomoto Co. v. Int'l Trade Comm'n*, 597 F.3d 1267, 1272-1273 (Fed. Cir. 2010) The best mode analysis is a two-prong analysis, as explained by the Federal Circuit:

> [D]etermining compliance with the best mode requirement is a two-prong inquiry. First, the court must determine whether, at the time the patent application was filed, the inventor possessed a best mode of practicing the claimed invention. This prong is highly subjective; it focuses on the inventor's own personal preferences as of the application's filing date. Second, if the inventor has a subjective preference for one mode over all others, the court must then determine whether the inventor "concealed" the preferred mode from the public. In other words, the second prong asks whether the inventor's disclosure is adequate to

> enable one of ordinary skill in the art to practice the best mode of the invention. This second inquiry is objective; it depends upon the scope of the claimed invention and the level of skill in the relevant art.

Id. at 1273 (citations omitted). A best mode violation must be proven by clear and convincing evidence. *Teleflex*, 299 F.3d at 1330.

I find that Respondents have failed to offer clear and convincing evidence regarding the first prong of the best mode analysis. {

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Based on the foregoing, I find that Respondents have failed to provide clear and convincing evidence of a best mode violation.

2. Written Description

Respondents' Position: Respondents argue that Analog's proposed claim constructions result in claims that cover a broader scope than what is disclosed in the specification. According to Respondents, Analog's claim constructions grant a right to exclude far in excess of the inventor's contribution to the field as described in the specification. Therefore, Respondents contend that various claims are invalid because they violate the written description requirement of § 112, ¶ 1.

Respondents contend that there is no written description support for Analog's construction of "a compound having anti-stiction properties." Respondents note that there are broad classes of chemical compounds identified in the specification. (Citing CX-239C at Q.

121.) Respondents claim that construing the language to cover any anti-stiction compounds results in a violation of the written description requirement.

According to Respondents, the specification fails to identify a way for one of ordinary skill in the art to determine how to select a compound that would have anti-stiction properties. (Citing Tr. at 699:23-700:20.) Respondents claim that Dr. Martin's testimony demonstrates that it would require extensive undue experimentation for one of ordinary skill in the art to determine which compounds would possess the anti-stiction properties needed for the claimed invention. (Citing CX-157C at Q. 62-63; CX-238C at Q. 13, 26; JX-1; JX-2.)

Respondents argue that to the extent that the term "temperature sufficient to vaporize" is construed to be less than 100 degrees Celsius, the claims are invalid for failure to satisfy the written description requirement. Respondents assert that the specification clearly discloses heating compounds in a range of 100 to 500 degrees Celsius and provides no other guidance for one of ordinary skill in the art to determine a temperature sufficient to vaporize.

Respondents argue that Analog's interpretation of the term "substantially at room temperature" lacks written description support. Respondents claim that there is no guidance in the specification regarding the meaning of the term "substantially at room temperature," and that the prosecution history even goes the opposite way by emphasizing heating wafers at a high temperature. (Citing JX-3 at ANALOG 6452.)

Respondents argue that Analog's interpretation of the term "sawing" lacks written description support. Respondents state that there is no description of "sawing" in the patent, and that a construction that moves beyond the ordinary meaning cannot be supported. According to Respondents, the ordinary meaning of "sawing" requires conventional sawing with a mechanical blade.

In their reply brief, Respondents claim that Analog has waived any written description requirement concerning "a compound having anti-stiction properties" and "a temperature sufficient to vaporize" because it did not address those issues in its post-hearing brief. (Citing CIB at 133.)

Analog's Position: Analog contends that none of the claims are invalid for lack of written description. According to Analog, Respondents offer only attorney argument and provide no actual evidence to support their position.

Analog notes that Respondents' position regarding "sawing" is in conflict with Dr. Ashurst's testimony that a person of ordinary skill in the art would have known many ways to separate a wafer in 2000, including the use of laser saws. (Citing Tr. at 615:24-616:12.) Analog argues that Dr. Ashurst had no trouble understanding the meaning of the term "substantially at room temperature." (Citing Tr. at 626:11-23, 628:14-629:6.) Regarding the terms "a compound having anti-stiction properties" and "a temperature sufficient to vaporize," Analog asserts that one of Respondents' experts, Dr. Wallace, agrees with Analog's proposed constructions. (Citing Tr. at 444:3-12; RX-204C at Q. 30.)

In its reply brief, Analog argues that Respondents waived their written description defense because they failed to raise it in response to an interrogatory seeking their invalidity contentions. Analog states that Respondents' interrogatory response referred Analog to Respondents' expert reports, but the expert reports make no mention of the written description requirement. (Citing RX-47C; RX-54C.)

Analog further argues that Respondents abandoned their written description defense by devoting only a single page to this issue in their pre-trial brief. (Citing RPHB at 85-86.) Analog claims that Respondents' treatment of the issue in their pre-trial brief lacked the detail required

by Ground Rule 8.2. Analog reiterates that Respondents have failed to offer sufficient evidence to support their written description argues, and that the expert evidence that does exist supports Analog's position. (Citing Tr. at 444:3-17, 615:24-616:12; CX-239C at Q. 121.)

Staff's Position: Staff contends that there are no written description violations in the '614 patent.

With regard to "a compound having anti-stiction properties," Staff states that it is not aware of any evidence supporting a determination that the '614 patent fails to describe a compound having anti-stiction properties.

With regard to "a temperature sufficient to vaporize," Staff states that it is not aware of any evidence to support Respondents' argument. Staff notes that Dr. Wallace testified that he agreed with Analog's construction of the term and used it in his invalidity analysis. (Citing Tr. at 444:3-12.) Staff further notes that the specification discloses vaporizing the anti-stiction compound near room temperature and at temperatures ranging from 100-500°C. (Citing JX-1 at 8:47-9:23.)

With regard to the term "sawing," Staff is not aware of any evidence to support Respondents' position. Staff asserts that Respondents' expert testified that one of ordinary skill in the art would understand that "sawing" and "separating" are synonymous and do not require a blade. (Citing Tr. at 478:25-479:13.) Staff claims that when the '614 patent was filed, there were several means for separating wafers, including diamond blade saws and laser dicers. (Citing Tr. at 285:1-286:17, 318:6-18.)

With regard to the phrase "substantially at room temperature," Staff claims that Respondents failed to offer clear and convincing evidence of a violation of the written description requirement. Staff argues that one of ordinary skill in the art would know how to

practice the invention using HMDS as the anti-stiction compound "substantially at room temperature." (Citing CX-239C at Q. 117; Tr. at 594:21-597:11; JX-1 at 3:24-29, 8:32-64, 9:19-39.)

In its reply brief, Staff notes that its proposed construction for "a compound having anti-stiction properties" is not overly broad because it is taken directly from the Summary of the Invention. (Citing JX-1 at 1:35-40, 1:66-2:2.) Staff believes Analog's proposed construction is overly broad because it does not define the classes of compounds that may serve as the anti-stiction compound. Staff argues that under its proposed construction of "a compound having anti-stiction properties," there is no written description violation.

With regard to the term "substantially at room temperature," Staff asserts that Respondents' argument based on the prosecution history is misleading. According to Staff, the portion of the prosecution history cited by Respondents relates to the claims requiring that the wafers are heated in an oven or furnace. (Citing JX-3 at ANALOG00006449-6470, ANALOG00006452.) Staff states that "substantially at room temperature" appears in certain other claims, such as claim 34 of the '614 patent, that do not require that the wafers are heated.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents failed to offer clear and convincing evidence that any of the claims of the '614 patent are invalid for failure to comply with the written description requirement.[12]

The Federal Circuit, in a recent *en banc* decision addressing the written description requirement, stated that "the test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d

[12] Respondents raised their written description defense in both the Joint Stipulation of Contested Issues and the pre-hearing brief. (JSCI at ¶ 24; RPHB at 85-86.) Respondents provided Analog with adequate notice of this defense. Thus, I find that Respondents have not waived their written description defense.

1336, 1351 (Fed. Cir. 2010) (*en banc*). The court further explained that:

> [T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. Based on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.

Id. To provide invalidity based on the written description requirement, Respondents must present clear and convincing evidence. *Invitrogen Corp. v. Clontech Labs, Inc.*, 429 F.3d 1052, 1072 (Fed. Cir. 2005).

Respondents raise the issue of written description in connection with four claim terms: "a compound having anti-stiction properties," "a temperature sufficient to vaporize," "sawing," and "substantially at room temperature." I address each of these terms separately.

I find that Respondents have failed to provide clear and convincing evidence that there is a written description violation with regard to "a compound having anti-stiction properties." Respondents argue that any construction that does not limit the phrase "a compound having anti-stiction properties" to the specific compounds listed in the specification runs afoul of the written description requirement because such a construction "clearly grants a right to exclude far in excess of the inventor's contribution to the field described in the specification[.]" (RIB at 55.)

The asserted claims of the '614 patent that include the phrase "a compound having anti-stiction properties" are method claims or product-by-process claims. None of the claims are product claims that claim the "compound having anti-stiction properties." The specification clearly demonstrates that the inventor had possession of an invention involving a method for providing an anti-stiction treatment for MEMS devices, as the specification provides multiple embodiments of the anti-stiction treatment process and identifies multiple anti-stiction compounds that may be used for such processes. (*See, e.g.*, JX-1 at 7:1-9:61.) The claims are not invalid for failure to meet the written description requirement simply because the phrase "a

compound having anti-stiction properties" is broader than the examples provided in the specification. *Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1371 (Fed. Cir. 2009) (explaining that "a patent claim is not necessarily invalid for lack of written description just because it is broader than the specific examples disclosed.")

Respondents offer the testimony of Dr. Ashurst to support their argument. Dr. Ashurst notes that the specification includes a discussion of broad classes of potential organo silicon compounds that may be used as anti-stiction agents. (RX-203C at Q. 125.) Dr. Ashurst then testified that "there are many compounds included in this description that fit the thermophysical properties in context, but cannot be anti-stiction compounds or are not known to impart anti-stiction properties." (*Id.* at Q. 126.) The sole relevant fact that this testimony demonstrates is that one of ordinary skill in the art, examining the specification, would understand which compounds would be suitable anti-stiction compounds, and which compounds would not be suitable anti-stiction compounds.

I find that Respondents have failed to provide clear and convincing evidence that there is a written description violation with regard to "a temperature sufficient to vaporize." Respondents argue that any construction that is not limited to the range of 100 to 500 degrees Celsius violates the written description requirement because the specification "provides no guides informing one having skill in the art how to discern the temperature sufficient to vaporize the specific chemicals listed in the specification." (RIB at 57.)

As described in detail in Section III.B.2, the specification provides examples regarding the temperatures needed to vaporize various anti-stiction compounds. Thus, I find that the inventor had possession of a process that requires "heating a compound having anti-stiction properties to a temperature sufficient to vaporize said compound." Moreover, one of

Respondents' experts testified that he agreed with Analog's proposed construction of "a temperature sufficient to vaporize," and Analog's proposed construction did not limit the meaning of the phrase to the 100-500°C range sought by Respondents. (Tr. at 444:3-17.) Such testimony undermines Respondents' argument and precludes the clear and convincing finding necessary for invalidity.

I find that Respondents have failed to provide clear and convincing evidence that there is a written description violation with regard to "sawing." While the specification does not provide any detailed explanation regarding the meaning of "sawing," the evidence demonstrates that one of ordinary skill in the art at the time of filing would have an understanding of the meaning of "sawing." (Tr. at 478:25-479:13, 615:24-616:12.) The evidence further demonstrates that the understood meaning of "sawing" would not be limited to cutting with a mechanical blade. (*Id.*) Therefore, I find no clear and convincing evidence that the inventor did not have possession of an invention that included a "sawing" step.

Finally, I find that Respondents have failed to provide clear and convincing evidence that there is a written description violation with regard to "substantially at room temperature." Respondents argue that "[t]here is no disclosure or description in the patents-in-suit of the claimed process whereby wafers are exposed to the vapor of an anti-stiction compound at 'substantially room temperature.'" (RIB at 58.) Respondents offer no evidence that the inventor was not in possession of the invention of claim 34 of the '614 patent, which requires "exposing said wafer, substantially at room temperature, to the vapor of a compound having anti-stiction properties[.]" In Section III.B.5, I construed this phrase to mean "a temperature in the range of approximately 20°-25°C."

Respondents rely on a portion of the prosecution history that they claim proves that the

invention is really directed to exposing the wafer to high temperatures. (RIB at 58.) The portion of the prosecution history relied upon by Respondents clearly does not relate to claims such as claim 34. In the prosecution history, the applicant distinguishes the '740 patent by stating:

> The Applicant points out that Martin et al. ('740) teaches vapor deposition of specific materials in a "conventional box oven," not a CVD furnace or other furnace reaching a high temperature as required by the Applicant's claims.

(JX-3 at ANALOG00006452.)

This passage relates to the claims in the '614 patent directed to placing a wafer in a CVD furnace or other type of furnace, such as claims 1, 5, 10, 12, 15, and 29. On the other hand, claim 34 includes no limitation regarding a furnace. (JX-1 at 22:1-12.) Therefore, the above-cited passage from the prosecution history is irrelevant to claim 34 and the phrase "substantially at room temperature."

3. Enablement

Respondents' Position: Respondents raise two enablement arguments. First, Respondents argue that if the term "compound having anti-stiction properties" is construed with sufficient breadth to include compounds with long-chain alkyl groups or chlorosilanes, then any claims including such a limitation is invalid as not enabled. Respondents assert that the specification teaches against use of such compounds. (Citing JX-1 at 6:27-32.) Respondents assert that Analog's proposed construction would require undue experimentation.

Second, Respondents argue that if the term "temperature sufficient to vaporize" is construed to be broader than the inventor's statement of the acceptable range of 100-500°C, then all claims including such a limitation are invalid as not enabled. According to Respondents, the specification explicitly teaches that temperatures outside of 100-500°C are not acceptable. (Citing JX-1 at 8:57-60.) Thus, Respondents claim that the specification is inadequate as

teaching against what is alleged to be a claimed temperature (i.e. a temperature outside of that range).

Analog's Position: Analog argues that Respondents waived their enablement defense because they failed to raise it in response to an interrogatory seeking their invalidity contentions. Analog states that Respondents' interrogatory response referred Analog to Respondents' expert reports, but the expert reports make no mention of the enablement requirement. (Citing RX-47C; RX-54C.)

Analog also claims that Respondents abandoned their enablement defense by failing to raise it in their pre-hearing brief. (Citing Ground Rule 8.2.) Analog states that even if the enablement argument is considered, it is based on attorney argument and should be rejected. (Citing RIB at 59-61.)

Staff's Position: Staff asserts that Respondents' argument should be deemed abandoned or withdrawn because Respondents' enablement defense was not raised in their pre-hearing brief. Staff claims that Respondents' enablement arguments thus violate Ground Rule 8.2.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have abandoned the enablement defense. As Analog and Staff note, Respondents failed to offer an enablement argument in their pre-hearing brief. (RPHB at 84-86.) Respondents' attempt to raise enablement in the post-hearing briefing is a violation of Ground Rule 8.2. That rule states that "[t]he pre-trial brief shall set forth **with particularity** a party's contentions on each of the proposed issues…" and "[a]ny contentions not set forth in detail [in the pre-hearing brief] shall be deemed abandoned or withdrawn[.]" Because the enablement defense was not raised in Respondents' pre-hearing brief, I find that it has been abandoned by Respondents.

Assuming *arguendo* that Respondents' enablement argument was properly presented, I find that Respondents failed to meet their burden. Respondents' enablement argument is brief, and contains no citation to supporting evidence to demonstrate a violation of the enablement requirement. Respondents' attorney's argument does not amount to clear and convincing evidence of invalidity based on a failure to meet the enablement requirement. *Johnston v. IVAC Corp.*, 885 F.3d 1574, 1581 (Fed. Cir. 1989) ("Attorneys' argument is no substitute for evidence.")

4. Indefiniteness

Respondents' Position: Respondents offer three indefiniteness arguments. First, they argue that "a compound having anti-stiction properties" is indefinite because the limitation is purely functional. Respondents assert there is no way to determine the scope of this purely functional language, thus rendering it indefinite.

Respondents next argue that "a temperature sufficient to vaporize" is indefinite. Respondents claim that the patent fails to provide any quantitative metric or formula for determining the particular temperature or range of temperatures claimed.

Finally, Respondents assert that "substantially at room temperature" is indefinite. Respondents state that there is no way to determine the temperature range encompassed by the phrase "substantially at room temperature." Respondents assert that Analog's argument that a temperature as high as 35°C meets this claim element underscores the indefiniteness of the language. (Citing CX-239C at Q. 118.)

Analog's Position: Analog argues that Respondents waived their indefiniteness defense because they failed to raise it in response to an interrogatory seeking their invalidity contentions. Analog states that Respondents' interrogatory response referred Analog to Respondents' expert

reports, but the expert reports make no mention of the indefiniteness defense. (Citing RX-47C; RX-54C.)

Analog also claims that Respondents abandoned their indefiniteness defense by failing to raise it in their pre-hearing brief. (Citing Ground Rule 8.2.) Analog states that even if the indefiniteness argument is considered, it is based on attorney argument and should be rejected. (Citing RIB at 59-61.)

Staff's Position: Staff asserts that Respondents' argument should be deemed abandoned or withdrawn because Respondents' indefiniteness defense was not raised in their pre-hearing brief. Staff claims that Respondents' indefiniteness arguments thus violate Ground Rule 8.2.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have abandoned the indefiniteness defense. As Analog and Staff note, Respondents failed to offer any indefiniteness argument in their pre-hearing brief. (RPHB at 84-86.) Respondents' attempt to raise indefiniteness in the post-hearing briefing is a violation of Ground Rule 8.2. That rule states that "[t]he pre-trial brief shall set forth **with particularity** a party's contentions on each of the proposed issues…" and "[a]ny contentions not set forth in detail [in the pre-hearing brief] shall be deemed abandoned or withdrawn[.]" Because the indefiniteness defense was not raised in Respondents' pre-hearing brief, I find that it has been abandoned by Respondents.

Assuming *arguendo* that Respondents' indefiniteness defense was properly raised, I find that Respondents' have not met their burden to demonstrate that the claims are invalid due to indefiniteness. In Section III.B *supra*, I construed the phrases "a compound having anti-stiction properties," "a temperature sufficient to vaporize," and "substantially at room temperature." Because I was able to construe these phrases, they are not indefinite. *Energizer Holdings, Inc. v.*

Int'l Trade Comm'n, 435 F.3d 1366, 1371 (Fed. Cir. 2006) ("A claim that is amenable to construction is not invalid on the ground of indefiniteness.")

5. Anticipation

a. The '767 Patent

Respondents' Position: Respondents contend that asserted claims 12, 15, 31, and 32 of the '614 patent are anticipated by U.S. Patent No. 5,597,767 ("the '767 patent").

Respondents assert that the '767 patent anticipates claim 12. Respondents claim that the '767 patent discloses the steps in a method for producing microelectromechanical devices. (Citing RX-203C at Q. 175; RX-20 at 2:53-55.) Respondents state that the '767 patent discloses inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into one of an oven or a furnace. (Citing RX-203C at Q. 176; Tr. at 714:2-15.) Respondents claim that the '767 patent discloses heating a compound having anti-stiction properties to a temperature sufficient to vaporize the compound. (Citing RX-203C at Q. 177.) Respondents argue that the reference discloses the use of PFDA, which is an anti-stiction compound. (Citing RX-203C at Q. 177; Tr. at 645:21-646:3; RX-25 at 3:25-35.)

Respondents assert that the '767 patent discloses depositing a vapor on the surface of a wafer so as to treat the surface with the compound and to coat said surface with the compound to a thickness between 5 and 25 Angstroms. (Citing RX-203C at Q. 178.) Respondents state that U.S. Patent No. 5,331,454 ("the '454 patent"), which the '767 patent incorporates by reference, discloses that the objective of the coating process is to generate a monolayer film on the device. (*Id.*) Respondents argue that precise ellipsometric measurements of the thickness of a PFDA monolayer establish this thickness to be 20 Angstroms. (Citing RX-44 at 172.) Respondents also claim that the thickness of a densely-packed, oriented monolayer can easily be estimated

using principles of geometry and known bond lengths from basic chemistry. Respondents state that using these principles, one of ordinary skill in the art would recognize that the thickness of a monolayer of PFDA is within the range of 5-25 Angstroms required by claim 12. (Citing RX-203C at Q. 187.)

Respondents argue that the '767 patent discloses removing the treated wafer from the oven or furnace. (Citing RX-203C at Q. 179.) Respondents state that the '767 patent discloses sawing the wafer to form a plurality of microelectromechanical devices after the deposition of the anti-stiction compound. (Citing RX-203C at Q. 180.) Respondents claim that the '767 patent discloses separating the wafer, which constitutes "sawing" under Analog's proposed construction. (Citing RX-20 at 4:30-33, 4:44-45.)

Respondents assert that the '767 patent anticipates claim 15. Respondents' arguments regarding the limitations of claim 15 that are materially identical to the limitations of claim 12 discussed *supra* will not be repeated.

Respondents claim that the '767 patent discloses the step of heating an anti-stiction compound within an oven or furnace for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize the compound. (Citing RX-203C at Q. 237.) Respondents rely on the disclosure of the '454 patent to meet this claim element. (Citing RX-25 at 3:37-46; RX-203C at Q. 237, 245.) Respondents assert that the '767 patent discloses depositing the vapor on the surface of the wafer so as to treat the surface with the compound. (Citing RX-203C at Q. 238; RX-25 at 3:19-35.)

Respondents assert that the '767 patent anticipates claim 31 for the same reasons raised with respect to claim 12. Respondents assert that the '767 patent anticipates claim 32 for the same reasons raised with respect to claim 15.

In their reply brief, Respondents claim that Analog's and Staff's arguments rest upon the incorrect premise that the '454 patent and U.S. Patent No. 5,512,374 ("the '374 patent") are not properly incorporated by reference into the '767 patent. Respondents argue that the '767 patent specifically incorporates by reference the anti-stiction processes from the '454 and '374 [patents and states that these processes could be done at the wafer level before separation into die. (Citing RX-203C at Q. 173; RX-20 at 5:25-31; Tr. at 640:4-14.)

Respondents assert that Analog's argument that the '454 patent is not directed to wafer-level passivation is misplaced. Respondents contend that the '454 patent discloses a process that may be used at the wafer level. (Citing Tr. at 714:2-15; RX-203C at Q. 176.) Respondents assert that Dr. Miller conceded that if the '454 patent is properly incorporated by reference into the '767 patent, then he did not render any opinions contrary to those submitted by Knowles that the '767 patent discloses the wafer-level aspect of the invention. (Citing Tr. at 849:3-850:11.)

Analog's Position: Analog contends that the '767 patent does not anticipate any of the asserted claims of the '614 patent.

Analog argues that Respondents have not introduced the two incorporated patent applications into evidence. Instead, Respondents rely on the issued patents that resulted from the referenced applications. Analog argues that Respondents cannot rely on the issued patents, but instead must rely on the applications that were specifically mentioned in the '767 patent. Analog argues that the '374 and '454 patents are not properly incorporated because (1) Respondents have not sufficiently tied the referenced applications to the '374 and '454 patents; (2) the referenced "U.S. patent application Ser. No. 5,331,454" does not exist; and (3) the '454 patent is not, in fact, an example of wafer-level passivation. Analog argues that even if the references are properly incorporated by reference, Respondents' argument is nothing more than a selection of

elements from three different prior art documents using hindsight analysis. According to Analog, this is an obviousness argument under the guise of an anticipation argument.

Respondents state that as a stand-alone reference, the '767 patent lacks every limitation from the asserted claims but for the "sawing" limitation. (Citing Tr. at 651:21-23, 641:9-12, 651:24-652:1, 652:2-6, 641:16-20, 653:8-10, 653:11-13.)

Even assuming that the '454 and '374 patents are incorporated by reference, Respondents claim that the '767 patent fails to disclose all elements of the asserted claims. Respondents assert that the '767 patent fails to disclose "inserting a wafer…into one of an oven or furnace." (Citing CX-239C at Q. 32; Tr. at 644:21-23.) Respondents state that the '767 patent does not disclose "removing said wafer from said oven or furnace." (Citing Tr. at 448:12-18, 649:21-25; CX-239C at Q. 34; RX-25 at 3:13-18, 3:36-39, 3:47-50.) Respondents state that the '767 patent does not disclose (depositing said vapor on a surface of said wafer," nor "depositing said vapor on said wafer surface." (Citing Tr. at 649:11-15; RX-15 at 5:37-41, 5:49-54; RX-25 at 3:13-18.) Finally, Respondents argue that the '767 patent fails to disclose "heating a compound…for a period between 1 and 60 minutes." (Citing CX-239C at Q. 40; Tr. at 650:14-651:6; CX-239C at Q. 146.)

Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence that the '767 patent anticipates any of the asserted claims of the '614 patent.

Staff argues that the '454 patent is not properly incorporated by reference in the '767 patent for two reasons. First, the patent identifies "U.S. patent application Ser. 5,331,454" instead of U.S. Patent No. 5,331,454. Second, the specific material that the '767 patent alleges to incorporate is not actually described in the '454 patent. (Citing Tr. at 644:13-20, 644:24-645:1.)

Staff states that assuming *arguendo* that the '454 patent is properly incorporated by reference into the '767 patent, Respondents have still failed to demonstrate anticipation. Respondents assert that there is no disclosure of treating a wafer with an anti-stiction compound, as the '767 patent directs one to look at the '454 patent for this issue, and the '454 patent only discloses passivation of a die, not a wafer. (Citing Tr. at 644:13-645:20; RX-58 at 2:24-3:18.) Staff asserts that the '767 patent does not disclose inserting wafers into an oven or furnace. (Citing Tr. at 641:9-12.) Staff asserts that the '767 patent fails to disclose a vapor deposition of an anti-stiction compound in an oven. (Citing Tr. at 641:13-20; CX-239C at Q. 137-141.)

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents failed to offer clear and convincing evidence that the '767 patent anticipates asserted claims 12, 15, 31, or 32 of the '614 patent.

The first question to resolve is whether or not the '454 and '374 patents are incorporated by reference into the '767 patent. "Whether and to what extent material has been incorporated by reference into a host document is a question of law." *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1283 (Fed. Cir. 2000). The Federal Circuit has explained:

> Material not explicitly contained in the single, prior art document may still be considered for purposes of anticipation if that material is incorporated by reference into the document. Incorporation by reference provides a method for integrating material from various documents into a host document-a patent or printed publication in an anticipation determination-by citing such material in a manner that makes clear that the material is effectively part of the host document as if it were explicitly contained therein. ***To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents.***

Id. at 1282 (citations omitted) (emphasis added); *see also In Re Seversky*, 474 F.2d 671, 674 (C.C.P.A. 1973) (explaining that incorporation by reference requires a statement "clearly identifying the subject matter which is incorporated and where it is to be found.")

The alleged incorporation statement in the '767 patent reads: "Examples of wafer-level passivation process [*sic*] are described in U.S. patent application Ser. No. 08/239,497, entitled 'PFPE Coatings for Micromechanical Devices', and in U.S. patent application Ser. No. 5,331,454, entitled 'Low Reset Voltage Process for DMD', each assigned to Texas Instruments Incorporated, and each incorporated herein by reference." (RX-20 at 5:25-31.)

I find that the statement in the '767 patent fails to properly incorporate by reference the '374 patent. The statement incorporates by reference U.S. Patent Application Ser. No. 08/239,497 ("the '497 application"), which happens to be the patent application that led to the '374 patent. The statement does not incorporate by reference the '374 patent. In their invalidity analysis, Respondents rely on the text from the '374 patent. Respondents do not explain why they did not rely instead on the '497 application, or why they did not offer the '497 application into evidence.

In *CIF Licensing, LLC v. Agere Sys., Inc.*, the court was faced with a similar situation, as a prior art patent incorporated by reference a patent application, and the defendant's expert relied instead on the patent that issued from the patent application. --- F. Supp. 2d ----, 2010 WL 3001775, at *18-19 (D. Del. Jul. 30, 2010). The court held that the patent application, and not the patent, was incorporated by reference, and that the defendant could not rely on the patent for its anticipation argument. *Id.* I concur with the sound reasoning of the court in *CIF Licensing* and conclude that Respondents may not rely on the '374 patent in arguing anticipation based on the '767 patent.

Respondents claim that Dr. Ashurst offered testimony that "the '497 Application referenced in the '767 Patent contains the disclosures of the '374 Patent verbatim." (RRB at 43.) Dr. Ashurst's direct testimony states that the text of the '374 patent "is verbatim identical to the

['497] application." (RX-203C at Q. 238, 303, 353.) At trial, Dr. Ashurst provides a less definite statement when he states that "[i]t's my understanding that the application referenced there was verbatim the text of the '374 patent." (Tr. at 640:7-9.) Importantly, there is no indication from Dr. Ashurst that he personally examined both the '374 patent and '497 application and confirmed that they contain the same disclosure. Such conclusory and equivocal testimony regarding this important issue cannot support a finding that the '374 patent is properly incorporated by reference.[13]

In addition, I find that the statement in the '767 patent fails to properly incorporate by reference the '454 patent. The '767 patent discloses the correct title and assignee of the '454 patent, but specifically incorporates by reference "U.S. patent application Ser. No. 5,331,454," instead of U.S. Patent No. 5,331,454. (RX-20 at 5:25-31.) In light of the Federal Circuit's guidance that "the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents," I cannot find that this reference in the '767 patent clearly incorporates by reference the '454 patent. *Advanced Display Sys., Inc.*, 212 F.3d at 1282. One could infer that the author intended to identify the '454 patent; but it also could be inferred that the author intended to identify the patent application that issued as the '454 patent. Such ambiguous language is not the identification "with detailed particularity" needed for a proper incorporation by reference. *Id.*

Because Respondents' anticipation argument relies on the '454 and '374 patents, I find that Respondents have failed to present clear and convincing evidence that the '767 patent anticipates asserted claims 12, 15, 31, or 32 of the '614 patent. The '767 patent includes minimal detail regarding a wafer-level anti-stiction process, and certainly not enough detail to

[13] Moreover, I note that Dr. Ashurst acknowledged in his testimony that it was the '497 application – and not the '374 patent – that was incorporated by reference when he stated "to be clear, it is the patent application that is incorporated by reference." (RX-203C at Q. 238.)

anticipate any of claims 12, 15, 31, or 32. (RX-20 at 5:18-32.) Each of claims 12, 15, 31, and 32 requires inserting a wafer into an oven or furnace, which is not disclosed by the '767 patent. (*Id.*) Each of claims 12, 15, 31, and 32 requires removing the treated wafer from the oven or furnace, which is not disclosed by the '767 patent. (*Id.*) Each of claims 12, 15, 31, or 32 requires heating an anti-stiction compound, which is not disclosed in the '767 patent. (*Id.*)

Assuming, *arguendo*, that the '454 and '374 patents are properly incorporated by reference into the '767 patent, Respondents have failed to offer clear and convincing evidence that the '767 patent anticipates any of the asserted claims of the '614 patent.

The '767 patent teaches a method of separating a wafer into a die whereby there is at least one wafer-level process performed prior to separation. (RX-20 at 1:45-62.) An example of a wafer-level processing step is "passivation," which the '767 patent explains is a process that "prevents or cures sticking between contacting surfaces[.]" (*Id.* at 4:30-33.) The '767 patent provides further detail regarding passivation when it explains:

> In general, this passivation step 23 is any wafer-level step performed to unstick any mirrors that are stuck in a tilted position, or to reduce the likelihood that the mirrors will stick. Various passivation techniques are possible, such as application of lubricative coatings, drying, and cleaning. Many passivation methods are directed to reducing the surface energy of any contacting surfaces, such as the underside of the mirrors and their landing points.

(*Id.* at 5:18-26.) The '767 patent then incorporates by reference two documents – the '454 patent and the '374 patent – that disclose "[e]xamples of wafer-level passivation process [*sic*][.]" (*Id.* at 5:25-31.)[14]

I find that the '454 patent fails to disclose the wafer-level anti-stiction process of claims 12, 15, 31, and 32. Each of the claims requires a wafer-level anti-stiction treatment, as each claim teaches treating the wafer and then sawing the wafer into individual

[14] To be clear, this finding is only made under the assumption that the Respondents successfully demonstrated that the '374 and '454 patents are in fact incorporated by reference into the '767 patent.

microelectromechanical devices.

Notwithstanding the statement made in the '767 patent, I find that the '454 patent does not disclose a wafer-level anti-stiction treatment process. The '454 patent clearly discloses dividing the wafer into chips before passivation. (RX-25 at 2:51-53, 3:8-18.) As the patent explains, "[a] preferred method is to place the ***chips with the surfaces to be passivated*** fully exposed, and a small quantity of the source material to be used as the passivating material together in a covered glass container." (*Id.* at 3:9-13.) This conclusion is supported by the credible testimony of Dr. Miller. (CX-239C at Q. 131-132.)

Dr. Ashurst acknowledged that the '454 patent does not disclose a wafer-level anti-stiction process. (Tr. at 644:17-645:20.) Respondents assert that Dr. Ashurst testified that it would be possible to use the anti-stiction process disclosed in the '454 patent on a wafer, and that one of ordinary skill in the art would know how to do so. (Tr. at 714:2-15.) The fact that one of ordinary skill in the art would know how to use the chip-level process of the '454 patent at the wafer level, even if true, is not sufficient to demonstrate anticipation. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) ("[I]n order to demonstrate anticipation, the proponent must show 'that the four corners of a single, prior art document describe every element of the claimed invention.'") (citation omitted).

The '374 patent fails to disclose the anti-stiction treatment of claims 12, 15, 31, and 32 for the reasons described in Section IV.B.5.c, *infra*. Nothing in the '767 patent or '454 patent cures the deficiencies found in the '374 patent.

Based on the foregoing, I conclude that Respondents failed to offer clear and convincing evidence that the '767 patent anticipates asserted claims 12, 15, 31, or 32 of the '614 patent.

b. The '740 Patent

Respondents' Position: Respondents contend that the '740 patent anticipates asserted claims 12, 15, 31, and 32 of the '614 patent.

Respondents assert that the '740 patent discloses every element of claim 12. (Citing RX-203C at Q. 190.) According to Respondents, Dr. Miller does not dispute that the '740 patent discloses all but the "wafer level" aspect of the elements of claim 12. (*Id.*) Respondents assert that the equipment used in the '740 patent at the time of the invention was suitable for wafer processing. (*Id.*) Respondents claim that the equipment is substantially identical to that of the '614 patent. (Citing RX-203C at Q. 192; RDX-1(h).)

Respondents point to a statement in the '740 patent that the vapor can be deposited on wafers prior to sawing. (Citing JX-34 at 5:30-32.) Respondents claim that in light of this statement, all elements of claim 12 are found in the '740 patent. Respondents argue that Analog cannot now try to explain away that statement as mere conjecture. Respondents describe how the '740 patent discloses the remaining elements of claim 12. (Citing RX-203C at Q. 193, 194, 195, 197, 198, 200.)

Respondents contend that the '740 patent anticipates claim 15. Respondents' arguments regarding the limitations of claim 15 that are materially identical to the limitations of claim 12 discussed *supra* will not be repeated.

Respondents claim that the '740 patent discloses heating a compound having anti-stiction properties within an oven or furnace for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize the compound. (Citing RX-203C at Q. 251; JX-34 at 5:25-29.) Respondents assert that it would have been known to one of ordinary skill in the art that processing in a conventional HMDS oven, as disclosed in the '740 patent, usually

takes between 5 and 30 minutes. (Citing RX-203C at Q. 251; RX-39.) Respondents note that Dr. Ashurst testified that the process disclosed in the '740 patent would last, in its entirety, between 5 and 30 minutes. (Citing Tr. at 721:12-20.)

Respondents assert that the '740 patent anticipates claim 31 for the same reasons raised with respect to claim 12. Respondents assert that the '740 patent anticipates claim 32 for the same reasons raised with respect to claim 15.

In their reply brief, Respondents note that the '740 patent was cited during the prosecution of the '614 patent. Respondents claim that the applicant mischaracterized the '740 patent during prosecution when it asserted that those of ordinary skill in the art know that vapor deposition in a box oven as taught by the '740 patent prior to singulation does not work. (Citing RX-203C at Q. 161.) Respondents claim that one of ordinary skill in the art at the time of the filing of the '614 patent would have known that wafer-level vapor deposition was possible. (Citing RX-204C at Q. 161; RX-199C at Q. 269:2-271:4.) Respondents argue that the disclosure of wafer-level vapor deposition in the '740 patent is an enabling disclosure. (Citing JX-34 at 5:1-8, 5:25-32; Tr. at 668:5-25; RX-203C at Q. 194.)

Respondents claim that Analog is incorrect to assert that Dr. Martin was the first to employ a wafer-level vapor process to deposit an anti-stiction compound. According to Respondents, this was being performed during the mid 1990s. (Citing RX-203C at Q. 200.) Respondents claim that Analog overstates the alleged solutions to the problems of liquid-phase deposition processes it claims are disclosed in the '614 patent. (Citing Tr. at 566:21-568:15, 692:18-24, 693:18-23, 687:19-22.)

Analog's Position: Analog contends that the '740 patent does not anticipate any of the asserted claims of the '614 patent.

Analog asserts that the '740 patent is directed to an anti-stiction process that is performed at the die level, but it includes a single sentence that references wafer-level deposition. (Citing JX-34 at 5:30-32.) Analog notes that the '740 patent was one of the primary prior art references considered by the Patent Office during the prosecution of the '614 patent. (Citing JX-3 at ANALOG 6428-29.) Analog argues that Respondents' burden is especially difficult because the '740 patent was considered during prosecution. (Citing *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984).)

Analog argues that the '740 patent fails to include any enabling details to instruct a person of ordinary skill in the art on how to perform vapor phase deposition at the wafer level. (Citing CX-239C at Q. 179.) Analog states that Dr. Ashurst acknowledged some of the difficulties associated with wafer-level, vapor phase deposition in a 2002 article. (Citing CX-225 at 2; Tr. at 666:1-667:6.)

Analog argues that the '740 patent does not disclose the limitation of depositing a vapor on the wafer surface to a thickness between 5 and 25 Angstroms, which is found in claims 12 and 31. Analog states that Dr. Ashurst acknowledged that the '740 patent includes no disclosure about the thickness of the layer. (Citing Tr. at 654:2-8.) Analog claims that Dr. Ashurst's opinion that one of ordinary skill in the art would have known that such a limitation was present is speculation and is based on an extraordinary knowledge of the art. (Citing Tr. at 718:3-719:6; CX-239C at Q. 180.)

Analog claims that the '740 patent does not disclose "heating a compound…for a period between 1 and 60 minutes" as required by claims 15 and 32. According to Analog, Dr. Ashurst conceded that the '740 patent does not mention any length of time that the anti-stiction compounds must be heated. (Citing Tr. at 654:9-13.) Analog states that Dr. Ashurst's opinion is

based on his view that processing in a conventional HMDS oven, as found in the '740 patent, usually takes between 5 and 30 minutes. (Citing RX-203C at Q. 251.) Analog argues that the fact that something "usually" happens does not rise to the level of an anticipatory disclosure. (Citing *Schering Corp. v. Genva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003).) In addition, Analog claims that Dr. Ashurst is referring to the processing time for the deposition and not the length of time that the anti-stiction compound is heated. Analog notes that Dr. Miller testified that the deposition time is separate and distinct that the amount of time that the anti-stiction compound is heated. (Citing CX-239C at Q. 182.)

Staff's Position: Staff contends that Respondents have failed to offer clear and convincing evidence of anticipation based on the '740 patent.

Staff asserts that the '740 patent is directed to die level passivation, and includes only one sentence that mentions wafer level passivation. (Tr. at 667:7-17.) Staff claims that all of the enabling disclosure of the '740 patent is directed to die level processes. (Citing CX-239C at Q. 179.)

Staff asserts that Dr. Ashurst's testimony that one of ordinary skill in the art would know how to achieve the invention in the '614 patent from reading the '740 patent should be rejected. (Citing Tr. at 667:18-23.) Staff claims that Dr. Ashurst's 2002 article addressing the problems with wafer level vapor deposition demonstrates the one of ordinary skill in the art at the time of the '740 patent would understand how to perform wafer level vapor deposition. (Citing CX-239C at Q. 179.) Staff states that Dr. Martin provided credible testimony that he did not have a complete idea for applying anti-stiction coatings at the wafer level until after the '740 patent. (Citing CX-157C at Q. 47-48; CX-238C at Q. 21-22.)

In its reply brief, Staff states that the evidence shows that the problems associated with

the wafer level process are not the same as the problems associated with the die level process. (Citing Tr. at 479:18-22, 481:15-20, 484:3-8.) Thus, Staff argues that the solution provided in the '740 patent cannot be applied to a wafer level process. Staff therefore concludes that the '740 patent does not contain an enabling disclosure of a wafer level anti-stiction process.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents failed to offer clear and convincing evidence that the '740 patent anticipates asserted claims 12, 15, 31, or 32 of the '614 patent.

The inventor of the patents-in-suit, Dr, Martin, is a named co-inventor on the '740 patent, which is assigned to Analog. (JX-34.) The '740 patent is discussed in the Background of the Invention section of the '614 patent specification, where it states:

> There has been some prior development of antistiction treatments that are applied during assembly and packaging. For example, U.S. Pat. No. 5,694,740 (hereafter referred to as '740) describes the vapor deposition of various organics, including silicones, alkoxysilanes and perfluoroethers, to the component during assembly. Although this treatment reduces stiction, it is not efficient to treat each individual component, since these electronic components are extremely small, and large numbers of these components are manufactured at one time.

(JX-1 at 1:41-50.)

The Patent Office considered the '740 patent during the prosecution of the '614 patent, and the prosecution history shows that the examiner cited the '740 patent, among other references, when rejecting proposed claims. (*See, e.g.,* JX-3 at ANALOG00006401-10.) Because the '740 patent was considered during prosecution, Respondents have "the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co.*, 725 F.2d at 1359.

The '740 patent is generally directed to die-level anti-stiction treatments. (JX-34 at 1:45-2:26.) The '740 patent makes clear that "according to the present invention, the vapor deposition

is performed ***after*** the wafers are sawed[.]" (*Id.* at 4:64-65) (emphasis added). Respondents focus on a single sentence from the '740 patent that states "[a]lternatively, these alkoxysilanes can also be vapor deposited onto dies on wafers in an oven such as that shown in FIG. 4 ***prior*** to sawing if desired." (*Id.* at 5:30-32) (emphasis added). Respondents argue that this sentence demonstrates that the '740 patent discloses a wafer-level anti-stiction process, as claimed in the '614 patent. (*See* RX-203C at Q. 190, 200.)

Analog and Staff argue that this brief disclosure in the '740 patent of a wafer-level process is not enabling. "An anticipating reference must be enabling; that is, the description must be such that a person of ordinary skill in the field of the invention can practice the subject matter based on the reference, without undue experimentation." *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1082 (Fed. Cir. 2008).

I concur, and find that the brief reference to wafer level processing in the '740 patent is not an enabling disclosure. Besides the single sentence cited *supra*, there is nothing in the specification that describes a vapor deposition of an anti-stiction compound on a wafer. (CX-239C at Q. 179.) This was acknowledged by Dr. Ashurst at the hearing. (Tr. at 667:12-17.)

The parties offer competing expert opinions regarding whether or not the '740 patent disclosure is enabling. Dr. Ashurst testified that:

> It would be well understood by one of ordinary skill in the art at the time of the '740 invention that a process used to successfully treat a plurality of MEMS dies could also be used to treat a wafer having a plurality of MEMS devices without substantial modification to the process. This type of scaleability of vapor processing is one of its chief advantages over wet processing.

(RX-203C at Q. 200.)

Dr. Miller testified that:

> To the extent wafer-level anti-stiction treatments were known prior to 2000, they were limited to liquid-based deposition methods and focused on reducing

> stiction during the MEMS release process. This is due, at least in part, to the fact that wafer-level vapor phase deposition methods presented numerous complicated factors that were not applicable to die-level and liquid based treatments.

(CX-239C at Q. 179.) Dr. Miller continued to explain the complicating factors unique to vapor phase deposition at the wafer level. (*Id.*) According to Dr. Miller, examples of such complicating factors include:

> poor performance of die attach adhesive when it is bonded to wafers coated with anti-stiction compounds; poor performance of wire bond (which forms electrical connection between chip and board) when an anti-stiction compound coats the bond pads; difficulty in coating large areas uniformly, especially when multiple wafers are placed in a single deposition chamber; overcoating of the anti-stiction layer during the packaging process, for instance by molecules that outgas from the die attach adhesive during adhesive deposition and curing; and stability of the anti-stiction layer to thermal processes present during packaging (*e.g.*, during wire bond, die attach, or package seal).

(*Id.*)

I find that Dr. Miller's testimony is more detailed than Dr. Ashurst's conclusory statement quoted *supra*, as Dr. Miller provides a specific explanation regarding the complications surrounding vapor phase deposition at the wafer level. (*Id.*) Dr. Miller's credible testimony thus demonstrates that one of ordinary skill in the art that read the '740 patent would need to perform undue experimentation to develop the wafer-level vapor deposition process claimed in the '614 patent. This is further supported by the 2002 article published by Dr. Ashurst that discussed the difficulties associated with vapor deposition at the wafer level, additional detail that is absent from the '740 patent. (CX-225; Tr. at 665:4-667:1.)

In addition, I find that the '740 patent fails to disclose the limitation of claims 12 and 31 that requires: "depositing said vapor on a surface of said wafer so as to treat said surface with said compound and to coat said surface with said compound to a thickness between 5 and 25 Angstroms."

To support their position that this limitation is disclosed in the '740 patent, Respondents rely on the testimony of Dr. Ashurst. Dr. Ashurst testifies that even though a thickness between 5 and 25 Angstroms is not expressly disclosed in the '740 patent, such a disclosure is inherent. (RX-203C at Q. 196.) Specifically, Dr. Ashurst testified that:

> One of ordinary skill in the art at the time of the '614 invention would recognize that the language presented in C5:38-44 [of the '740 patent] can only be referring to a monolayer and that a monolayer formed from that material would have a thickness in the range of 5-20 Angstroms, which is included in the specified range of 5 to 25 Angstroms from Claim 12 of the '614 Patent.

(*Id.*)

The passage cited by Dr. Ashurst states the following:

> Product number 112401-6, for example, is $F(CF_2)_8CH_2CH_2Si(OCH_2CH_3)_3$, a trifunctional silane that reacts with a silicon surface to form fluorocarbon chains attached to hydrocarbons which, in turn, are attached to the silicon. The intermediate hydrocarbon, in this case CH_2, joins the fluorocarbon molecules to the substrate with thermally stable covalent chemical bonds.

(JX-34 at 5:38-44.)

A prior art reference may inherently disclose a claim limitation if the claim limitation is necessarily present in the prior art reference. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) ("Inherent anticipation requires that the missing descriptive material is 'necessarily present,' not merely probably or possibly present, in the prior art.") (citation omitted). Dr. Ashurst relies on inherency to demonstrate that the '740 patent discloses the 5-25 Angstrom limitation of claims 12 and 31. Dr. Ashurst provides no explanation regarding why the passage quoted *supra* necessarily results in a monolayer with a thickness in the range of 5-20 Angstroms. Dr. Ashurst claims that the monolayer thickness would be approximately 14 Angstroms without explaining how he arrived at such a result. (Tr. at 720:6-17.) Such testimony is insufficient to meet the clear and convincing standard necessary for invalidity.

Furthermore, Dr. Miller testified that the disclosure cited by Dr. Ashurst does not necessarily disclose the formation of a monolayer with a thickness of 5-20 Angstroms. (CX-239C at Q. 180.) Dr. Miller opines that in some instances, multilayer, and not monolayer, growth will result. (*Id.*) Dr. Ashurst disagrees with Dr. Miller's opinion, but concedes that "[i]n extreme circumstances, it may be possible to vapor deposit multilayer films[.]" (RX-203C at Q. 202.) I find that such a concession provides further support for a finding that there is not clear and convincing evidence that '740 patent inherently discloses the 5-25 Angstrom limitation, as asserted by Respondents.

I find that the '740 patent fails to disclose the limitation of claims 15 and 32 that requires: "heating a compound having anti-stiction properties within said oven or furnace for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize said compound." To support their position, Respondents rely on Dr. Ashurst. Dr. Ashurst testified that while the disclosure of heating the compound between 1 and 60 minutes is not expressly disclosed in the '740 patent, it is inherently disclosed. (RX-203C at Q. 251.) Specifically, Dr. Ashurst states that it was well known to one of ordinary skill in the art at the time of the '614 patent that processing in a conventional HMDS box oven, as described in the '740 patent, usually takes between 5 and 30 minutes. (*Id.*; see also Tr. at 721:12-20.) Dr. Ashurst cites to no evidence to support his opinion, nor does he explain the basis for his opinion. Further, Dr. Ashurst's testimony is less than definite, as he stated that "processing in a conventional HMDS oven ***usually*** takes between 5 and 30 minutes[.]" (RX-203C at Q. 251) (emphasis added). Dr. Ashurst's unsupported opinions regarding inherency are insufficient to meet the clear and convincing standard for anticipation. *Motorola, Inc. v. Interdigital Tech. Corp.*, 121 F.3d 1461, 1473 (Fed. Cir. 1997) ("An expert's conclusory testimony, unsupported by the documentary

evidence, cannot supplant the requirement of anticipatory disclosure in the prior art reference itself.")

Respondents also rely on a document titled "Lab Manual" that addresses HMDS. (RX-39.) Specifically, Respondents cite to the portion of the document that lists three "available recipes" that each show a total time of between 1 and 60 minutes. (*Id.* at ¶ 8.1.) This document is in no way tied to the '740 patent, and Respondents fail to explain the context of this document. (*See* RIB at 83.) Dr. Ashurst does not offer an opinion regarding this document. (*See* RX-203C at Q. 251.) In light of Respondents' failure to provide any context or meaning to this document, I find that it is not clear and convincing evidence that the limitation at issue is inherently disclosed in the '740 patent.

In addition, the claim limitation at issue relates to the amount of time that the anti-stiction compound is heated. Respondents' evidence all relates to the time necessary to perform the vapor deposition. These are two separate times, and the evidence offered by Respondents regarding deposition time is not necessarily relevant to the time that the anti-stiction compound is heated. (CX-239C at Q. 182.)

Based on the foregoing, I find that Respondents failed to offer clear and convincing evidence that the '740 patent anticipates asserted claims 12, 15, 31, and 32 of the '614 patent.

c. The '374 Patent

Respondents' Position: Respondents contend that the '374 patent anticipates asserted claims 12, 15, 31, 32, 34, 38, and 39 of the '614 patent.

Respondents argue that the '374 patent discloses all of the elements of claim 12. (Citing RX-204C at Q. 53-54.) Respondents state that the '374 patent discloses a method of producing a micromechanical device, which would have been understood by one of ordinary skill in the art to

be an equivalent term for a microelectromechanical device. (Citing RX-15 at 1:6-8, 1:19-21; RX-204C at Q. 55.) Respondents state that the '374 patent discloses a deposition process for a wafer with a plurality of MEMS. (Citing RX-15 at 5:37-46.) According to Respondents, the wafers are placed in an oven to enable the vapor deposition. (Citing RX-15 at 5:49-51; RX-204C at Q. 57-58.)

Respondents claim that the '374 patent discloses the step of heating an anti-stiction compound to a temperature sufficient to vaporize the compound. (Citing RX-15 at 5:1-30, 5:49-51.) Respondents state that the '374 patent discloses the use of perfluoropolyethers ("PFPE"). (Citing RX-204C at Q. 60-61.) Respondents claim that the process results in the wafers being coated with a film of PFPE, and the film has a thickness between 5 and 100 Angstroms. (Citing RX-15 at 7:9-11; RX-204C at Q. 62.) Respondents state that the '374 patent discloses removing the treated wafers from the oven and then separating the wafers into chips. (Citing RX-204C at Q. 63-64; RX-15 at 3:37-46.)

Respondents argue that the '374 patent anticipates claim 15 of the '614 patent. (Citing RX-204C at Q. 68.) Respondents' arguments regarding the limitations of claim 15 that are materially identical to the limitations of claim 12 discussed *supra* will not be repeated. Respondents state that a person of ordinary skill in the art would know that thermal evaporation to obtain a sufficient PFPE vapor pressure requires heating, and that the process would be completed in between 1 and 60 minutes. (Citing RX-204C at Q. 60-61, 70, 72-74.)

Respondents assert that the '374 patent anticipates claim 31 for the same reasons raised with respect to claim 12. Respondents assert that the '740 patent anticipates claim 32 for the same reasons raised with respect to claim 15.

Respondents argue that the '374 patent anticipates claim 34. Respondents' arguments

regarding the limitations of claim 34 that are materially identical to the limitations of claim 12 and 15 discussed *supra* will not be repeated. Respondents argue that a person of ordinary skill in the art would know that PFPEs may be deposited at room temperature, and that the deposited PFPE films result in a low surface energy with anti-stiction properties. (Citing RX-204C at Q. 98; RX-15 at 5:1-30, 5:51-53.)

Respondents argue that the '374 patent anticipates claim 38. Respondents claim that the '374 patent discloses the vapor deposition of the anti-stiction compound with a thickness between 5 and 100 Angstroms. (Citing RX-15 at 7:9-11; RX-204C at Q. 62, 99-101.) Respondents argue that the '374 patent anticipates claim 39. Respondents claim that the '374 patent discloses exposing the wafer to vapor for a period of between 1 and 60 minutes. (Citing RX-204C at Q. 74, 93-98.)

In their reply brief, Respondents argue that inserting a wafer into an oven or furnace is an inherent step in the process disclosed in the '374 patent. (Citing Tr. at 717:4-24.) Respondents argue that the '374 patent discloses a process that takes seconds to minutes, thereby meeting the requirement that the anti-stiction compound is heated for a period between 1 and 60 minutes. (Citing RX-15 at 5:63-6; Tr. at 720:24-721:11.)

Respondents claim that Analog repeatedly raises the issue of complicating factors. Respondents assert that the identified complicating factors neither relate to wafer-level vapor deposition, nor are the solutions to them disclosed by or claimed in the asserted claims. Respondents assert that Dr. Ashurst's testimony on the subject does not support Analog's contentions. (Citing Tr. at 566:21-568:15, 691:17-693:23, 687:19-22.) Respondents claim that Analog also overstates by alleging that the invention of the '614 patent overcomes post-processing steps. According to Respondents, none of the claimed limitations pertain to any

novel step or combination of steps to overcome these problems. (Citing RX-644C at Q. 127.)

Analog's Position: Analog contends that the '374 patent does not anticipate any of the asserted claims of the '614 patent.

Analog argues that the '374 patent does not provide any enabling details related to wafer-level vapor phase deposition. (Citing CX-239C at Q. 20-21.) Analog further argues that the '374 patent does not address any of the complicating factors associated with vapor phase deposition at the wafer level. (Citing CX-239C at Q. 22-26.) Analog claims that while Dr. Wallace acknowledged that complicating factors exist, none of the complicating factors are discussed in the '374 patent. (Citing Tr. at 479:16-22, 480:25-481:9, 481:15-20, 481:21-482:8.)

Analog claims that the '374 patent fails to disclose use of an oven or furnace. (Citing CX-239C at Q. 32.) Analog states that Dr. Wallace concedes that the '374 patent makes no mention of the use of an oven or furnace. (Citing Tr. at 448:12-18, 447:24-448:2.) Analog states that Respondents rely on a reference to "thermal evaporative techniques" in the '374 patent, but that such a references does not necessarily involve the use of an oven or furnace. (Citing Tr. at 452:12-453:6, 457:3-18, 458:13-23, 459:22-460:6, 650:1-8; CX-239C at Q. 32.)

Analog claims that the '374 patent fails to disclose the limitation of "heating a compound...for a period between 1 and 60 minutes," as found in asserted claims 15 and 32. Analog states that Respondents rely on the sentence in the '374 patent that states that "[m]onolayer films may be obtained on time scales ranging from seconds to minutes." (Citing RX-15 at 5:67-6:31; RX-204C at Q. 74.) Analog asserts that this sentence relates to the length of the deposition process, and not the length of time that the anti-stiction compound is heated. (Citing CX-239C at Q. 40.) Analog claims that the length of the deposition process does not necessarily correspond to how long the anti-stiction compound is heated. (Citing CX-239C at Q.

40; Tr. at 113:3-4, 765:6-8.)

Analog argues that the '374 patent fails to disclose vapor phase deposition for wafers. Analog states that the '374 patent discloses depositing a PFPE film on individual devices, an array of individual devices, or a wafer. (Citing RX-15 at 5:37-41.) Analog states that the '374 patent also discloses several deposition methods, such as liquid deposition, vapor deposition, and deposition as a fine mist. (Citing RX-15 at 5:49-54.) Analog argues that the '374 patent never ties vapor phase deposition to wafers. Analog argues that the '374 patent provides no details regarding the materials used or steps required for vapor phase deposition at the wafer level. (Citing Tr. at 472:3-15.)

Analog argues that the '374 patent fails to disclose the step of "exposing said vapor, substantially at room temperature, to the vapor of a compound," as required by claim 34. Analog states that Respondents rely on a table from the '374 patent that shows compounds that have a range of vapor pressures at different temperatures. (Citing RX-204C at Q. 98.) Analog claims that this table is irrelevant, as there is no disclosure in the '374 patent about the temperature of the wafers during the deposition process, and the term "room temperature" does not appear in the patent. (Citing CX-239C at Q. 52.)

In its reply brief, Analog asserts that Respondents have no expert testimony regarding claim 39, as Dr. Wallace's testimony regarding that claim was struck during the pre-trial conference. (Citing Tr. at 8:1-25.) Analog reiterates its arguments regarding the alleged shortcomings of the '374 patent from its initial brief.

Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence that the '374 patent anticipates any of the asserted claims of the '614 patent.

Staff claims that the '374 patent fails to fully describe a vapor deposition process that

takes place in an oven where wafers are placed for application of an anti-stiction compound. (Citing Tr. at 469:21-472:15.) Staff notes that while the '374 patent discloses applying a PFPE film to wafers, no further details are provided. (*Id.*) Staff claims that additional detail is provided only with regard to applying PFPE to single MEMS device. (Citing Tr. at 473:12-474:24; CX-239C at Q. 20-23.)

Staff also argues that Dr. Wallace's testimony was not sufficiently specific, inconsistent, and legally flawed. (Citing Tr. at 464:15-465:6, 453:24-456:11, 641:1-4.) In light of this, Staff argues that Dr. Wallace's testimony should be given little or no weight.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the '374 patent anticipates asserted claims 12, 15, 31, 32, 34, 38, or 39 of the '614 patent.

The '374 patent is entitled "PFPE coatings for micro-mechanical devices." (RX-15.) The '374 patent discloses using PFPE to prevent stiction on a micro-mechanical device: "[i]n the improved device, at least one, and preferably both, of the contacting portions of the elements have deposited thereon a film of perfluoropolyether (PFPE). The PFPE film is effective to ameliorate or prevent sticking or adhesion of the elements." (*Id.* at 2:51-55.)

The '374 patent explains that the deposition may be done at the wafer level: "[i]n the case of fabricating DMD's 10, the process may be performed on an individual DMD 10, simultaneously on an array of DMD's 10, or on a wafer on which have been formed numerous DMD arrays, the wafer being eventually separated into chips, each having one array of DMD's 10." (RX-15 at 5:37-41.)[15] The '374 patent discloses applying the PFPE through vapor deposition: "PFPE may be deposited as a vapor by vapor deposition at low pressure or by thermal evaporative techniques, as a fine mist or an aerosol or other sol produced by an

[15] "DMD" stands for "deformable mirror device" or "digital micromirror device." (RX-15 at 1:23-27.)

appropriate mechanism such as a nebulizer or atomizer, or as a liquid film resulting from dipping or spinning." (*Id.* at 5:48-53.)

Asserted claims 12, 15, 31, and 32 each require that a wafer is inserted into and removed from one of an oven or a furnace. I find that there is no clear and convincing evidence that the '374 patent discloses a process whereby a wafer is inserted into and removed from an oven or furnace. With regard to the oven or furnace requirement, Respondents rely on Dr. Wallace's testimony. (RIB at 78.) Dr. Wallace stated the following:

> One of ordinary skill in the art would know that vapor deposition by low pressure or thermally evaporative techniques includes the user of a chamber, such as an oven or furnace, for such vapor deposition. One of ordinary skill in he art would also know that a wafer with MEMS devices must be placed into this chamber for the deposition to occur, and then remove it to produce a useful product.

(RX-204C at Q. 56.)

As can be seen by his testimony, Dr. Wallace does not contend that the use of an oven or furnace is expressly disclosed in the '374 patent. Dr. Wallace acknowledged that the words "oven" or "furnace" do not appear in the '374 patent. (Tr. at 448:12-18.) Instead, he claims that this limitation is inherently present due to the statement: "PFPE may be deposited as a vapor by vapor deposition at low pressure or by thermal evaporative techniques[.]" (RX-15 at 5:48-53.)

On cross examination, Dr. Wallace acknowledged that this statement does not necessarily mean that an oven or furnace is used in the deposition process. (Tr. at 452:5-453:13, 457:3-18, 458:13-23, 459:22-460:6.) Dr. Ashurst provided similar testimony. (Tr. at 650:1-8.) Because Respondents' experts acknowledged that the above-quoted passage from the '374 patent does not necessarily require the presence of an oven or furnace, there is no clear and convincing evidence that the oven or furnace element of claims 12, 15, 31, and 32 is inherently disclosed in the '374 patent. *Trintec Indus., Inc.*, 295 F.3d at 1295. This is supported by Dr. Miller's testimony, as

Dr. Miller opines that the '374 patent does not expressly or inherently disclose the use of an oven or furnace. (CX-239C at Q. 32.)

Asserted claims 15 and 32 both require that the anti-stiction compound is heated "for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize said compound." I find that there is no clear and convincing evidence that this limitation is disclosed in the '374 patent.

Respondents rely on Dr. Wallace's testimony to demonstrate the presence of this element. (RIB at 85.) Dr. Wallace relies on the following passage from the '374 patent:

> The thickness of the PFPE film 31 deposited as an aerosol or vapor is a function of the time during which the DMD 10 is exposed thereto, as well as a function of molecular weight, viscosity, vapor pressure and reactivity of the particular PFPE selected. Monolayer films may be obtained on time scales ranging from seconds to minutes.

(RX-15 at 5:63-6:31.)

Dr. Wallace does not explain how this passage discloses the limitation requiring that the anti-stiction compound is heated for a period between 1 and 60 minutes. His testimony continues to describe work he performed at Texas Instruments, which is irrelevant for the purposes of the anticipation analysis. (RX-204C at Q. 74; RX-367.) Dr. Ashurst also testified regarding this claim element, acknowledging that the '374 patent does not expressly disclose the 1-60 minute time period found in claims 15 and 32. (Tr. at 650:14-651:6.)

The above-quoted portion from the specification relates to the deposition time, and not the length of time that the anti-stiction compound is heated. Dr. Miller offers credible testimony that "[t]he length of time that an anti-stiction compound is subjected to heat need not correspond to the length of the deposition process." (CX-239C at Q. 40.) To help prove this point, Dr. Miller offers as an example Knowles' process, where the length of the deposition process differs

from the length of time that the anti-stiction compound is heated. (*Id.*; CX-24C at 33:7-14, 69:5-70:1.) Therefore, I find that the passage relied upon by Dr. Wallace does not demonstrate by clear and convincing evidence that the anti-stiction compound of the '374 patent is heated "for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize said compound." Nor do I find that there is any evidence that the passage relied upon by Dr. Wallace inherently discloses the claim limitation at issue.

Asserted claim 34 requires "exposing said wafer, substantially at room temperature, to the vapor of a compound having anti-stiction properties." I construed "substantially at room temperature" to mean "a temperature in the range of approximately 20°-25°C." I find that there is no clear and convincing evidence that this limitation is disclosed in the '374 patent.

Respondents rely on Dr. Wallace's testimony to prove the existence of this element in the '374 patent. (RIB at 86.) Dr. Wallace relies on a table of PFPE's found in the '374 patent. (RX-204C at Q. 98.) Dr. Wallace states:

> The '374 Patent discloses vapor deposition of perfluoropolyethers, which have a range of vapor pressures at different temperatures (C5:1-30). For example the PFPE "Z25" has an extremely low vapor pressure at room temperature, and results in a thin coating on a surface upon exposure for a given duration. In contrast, the PFPE "Y04" has a higher vapor pressure at room temperature, and thus can result in a thicker coating for the same duration.

(RX-204C at Q. 98.)

I find that the table relied upon by Dr. Wallace does not demonstrate that the "substantially at room temperature" limitation is met. The table lists various types of PFPE's, and provides characteristics such as molecular weight, kinematic viscosity, vapor pressure, and specific gravity for each PFPE. (RX-15 at 5:1-30.) When displaying vapor pressure, it displays two different values – one at 20°C and one at 100°C. (*Id.*) The table includes no disclosure of a process whereby the anti-stiction compound is deposited on a wafer "substantially at room

temperature." Therefore, the table does not provide the information needed to meet this claim element. Dr. Miller's testimony also supports this finding. (CX-239C at Q. 52.)

Because claims 38 and 39 depend from claim 34, they are not anticipated by the '374 patent for the same reasons described with respect to claim 34. *See In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Assuming *arguendo* that the '374 patent anticipates claim 34, I find that Respondents have failed to offer clear and convincing evidence that the '374 patent anticipates claim 38. Respondents and Dr. Wallace rely on the disclosure in the '374 patent that "a suitable thickness of the PFPE film 31 has been found to be in the range of approximately 5 angstroms to approximately 100 angstroms." (RX-15 at 7:9-11.) Claim 38 requires "a thickness between 5 and 25 Angstroms."

I find that the disclosure of the range of approximately 5-100 Angstroms does not anticipate claim 38, which requires a range of 5-25 Angstroms. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006). In *Atofina*, the claim at issue included a range of 330 to 450 degrees Celsius, while the prior art disclosed a range of 100 to 500 degrees Celsius. *Id.* The court explained that "[g]iven the considerable difference between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim." *Id.* Consistent with this reasoning, I find that no reasonable fact finder could conclude that a prior art reference disclosing a range of approximately 5-100 Angstroms discloses the claimed range of 5-25 Angstroms with sufficient specificity to anticipate this limitation.

Assuming *arguendo* that the '374 patent anticipates claim 34, I find that Respondents have failed to offer clear and convincing evidence that the '374 patent anticipates claim 39.

Claim 39 requires exposing the wafer to the vapor for a period of between 1 and 60 minutes. Respondents rely on the passage from the '374 patent that states that "[m]onolayer films may be obtained on time scales ranging from seconds to minutes." (RX-15 at 5:67-6:31.) Such a disclosure does not anticipate claim 39. In addition, I note that Dr. Wallace's invalidity opinions regarding claim 39 were stricken, leaving Respondents with no expert testimony to support their assertion that the '374 patent anticipates claim 39. (Tr. at 8:1-9:13.)

6. Obviousness

a. Level of Ordinary Skill in the Art

Respondents' Position: Respondents contend that a person of ordinary skill in the art as of February 1, 2000 would have a degree in engineering or one of the physical sciences, a minimum of one or two years of full-time experience in anti-stiction, and general knowledge of the chemistry and processes used for anti-stiction, including an understanding of surface chemistry and the characterizations, functions, attributes, and processes used to manipulate surface chemistry. (Citing RX-203C at Q. 25.)

Analog's Position: Analog contends that a person of ordinary skill in the art as of February 1, 2000 would have had a degree in engineering or one of the physical sciences, a minimum of 1 year of experience with MEMS devices, and a general knowledge of the manufacturing of MEMS devices that would include an understanding of the effect of stiction on the reliability of MEMS devices. (Citing CX-158C at Q. 150.)

Staff's Position: Staff states that it agrees with the definition of the level of skill in the art proposed by Analog. Staff notes that it does not expect the infringement or validity analyses to depend on the definition of the definition of level of skill in the art adopted.

Discussion and Conclusion: Based on the evidence in the record, I find that a person of

ordinary skill in the art as of the priority date for the '614 patent would have a bachelor's degree in engineering or one of the physical sciences, a minimum of 1 year of experience with MEMS devices, and a general knowledge of the manufacturing of MEMS devices that would include an understanding of the effect of stiction on the reliability of MEMS devices. (CX-158C at Q. 150.)

Respondents' definition includes more experience in the field of anti-stiction and more specialized knowledge regarding the chemistry and processes used for anti-stiction. Respondents rely on Dr. Ashurst's testimony to support this definition. (RX-203C at Q. 25.) Dr. Ashurst's testimony is conclusory, as he merely states that he started with the level of ordinary skill in the art from Investigation No. 337-TA-629, and altered it "[b]ased on [his] knowledge of the level of skill in the art at the time of the inventions and based on [his] expertise[.]" (*Id.*)

I find that the heightened experience and knowledge required by Respondents' definition is beyond what one of ordinary skill in the art would have known as of February 2000. (CX-158C at Q. 152-154.) Specifically, Dr. Miller noted that Dr. Loeppert testified that Knowles began its development work on MEMS products in 1989, but did not begin its efforts to mitigate stiction until 1998. (*Id.*; CX-23C at 17:1-20:18.) This supports Dr. Miller's opinion that it was not until the late 1990's that companies began to recognize the need for anti-stiction coatings to MEMS to prevent stiction-related failures after MEMS release. (CX-158C at Q. 154.) Thus, a person of ordinary skill in the art in 2000 would have some, but not a substantial amount, of knowledge and experience in the field of addressing stiction in MEMS devices.

Respondents assert that Dr. Miller offered his opinion without considering two articles cited in Dr. Miller's own 2002 article concerning stiction in MEMS packaging. (RX-649.) Each of these cited articles is authored by individuals employed by Texas Instruments. (RX-648; RX-650.) The articles both address DMDs. (*Id.*) The articles both briefly touch on the problem of

stiction, but neither article is devoted to the subject. (RX-648 at ¶ 5.0; RX-650 at 1694.) One article was published in 1995, while the other article was published in 1998. (RX-649 at 139.) I find that the existence of these articles does not contradict or rebut Dr. Miller's testimony that preventing stiction in MEMS devices was not widely known or recognized until the late 1990's. (CX-158C at Q. 154.)

b. The '740 Patent In View of Wang

Respondents' Position: Respondents contend that the combination of the '740 patent with an article entitled "Vapor Phase Deposition of Uniform & Ultrathin Silanes" by Wang and Ferrari ("Wang") renders obvious asserted claims 12, 15, 31, 32, 34, 35, 38, and 39.

Respondents argue that both references are directed at technologies for applying organosilane compounds to silicon substrates to manipulate the surface properties and address stiction utilizing vapor phase processing. (Citing RX-203C at Q. 206.) Respondents argue that there is a reason to combine the '740 patent and Wang. (Citing RX-203C at Q. 208-209.)

Respondents arguments regarding the disclosures of the '740 patent have already been explained in Section IV.B.5.b, *supra* and will not be repeated. Respondents argue that the combination of the '740 patent and Wang renders claim 12 obvious. Respondents state that Wang discloses the requirement that the surface coating have a thickness between 5 and 25 Angstroms. Respondents claim that Wang discloses a measured film thickness of about 10 Angstroms for monolayers produced by vapor deposition of an organosilane. (Citing RX-203C at Q. 214; RX-42 at 23.)

Respondents argue that the combination of the '740 patent and Wang renders claim 15 obvious. Respondents state that Wang discloses the requirement that the anti-stiction compound is heated for a period between 1 and 60 minutes. (Citing RX-203C at Q. 286.) Respondents

argue that Wang discloses a silanization time in the range of 10-15 minutes. (Citing RX-42 at 21; RX-203C at Q. 286.)

Respondents argue that the combination of the '740 patent and Wang renders claim 31 obvious for the same reasons as described with respect to claim 12. Respondents argue that the combination of the '740 patent and Wang renders claim 32 obvious for the same reasons as described with respect to claim 15.

Respondents argue that the combination of the '740 patent and Wang renders claim 34 obvious. Respondents state that Wang discloses the requirement that the wafer, substantially at room temperature, is exposed to the vapor of an anti-stiction compound. (Citing RX-42 at 23; RX-203C at Q. 426.) Respondents assert that Wang also discloses the step of depositing the vapor in the wafer surface. (Citing RX-203C at Q. 427; RX-42 at 23.)

Respondents argue that the combination of the '740 patent and Wang renders claim 35 obvious. Respondents claim that Wang discloses the use of an organo silicon compound as the anti-stiction compound. (Citing RX-42 at 20; RX-203C at Q. 457.)

Respondents argue that the combination of the '740 patent and Wang renders claim 38 obvious. Respondents state that Wang discloses the requirement that the surface coating have a thickness between 5 and 25 Angstroms. Respondents claim that Wang discloses a measured film thickness of about 10 Angstroms for monolayers produced by vapor deposition of an organosilane. (Citing RX-203C at Q. 486; RX-42 at 23.)

Respondents argue that the combination of the '740 patent and Wang renders claim 39 obvious. Respondents state that Wang discloses the requirement that the vapor is exposed to the wafer for a period between 1 and 60 minutes. (Citing RX-203C at Q. 514.) Respondents argue that Wang discloses a silanization time in the range of 10-15 minutes. (Citing RX-42 at 21, 23.)

In their reply brief, Respondents reiterate that there is a motivation to combine the '740 patent and Wang. Respondents note that the Wang '026 patent is based upon the same information as is included in the Wang reference, and that the Wang '026 patent was cited during the prosecution of the '614 patent. (Citing JX-3 at ANALOG00006445.) Respondents assert that Wang addresses the very same problem addressed in the '614 patent – preventing stiction in MEMS devices. (Citing RX-42 at 20.)

Analog's Position: Analog contends that the combination of the '740 patent and Wang does not render any of the asserted claims obvious.

Analog argues that there is no motivation to combine the '740 patent and Wang because Wang does not relate to anti-stiction treatments. Analog claims that Wang instead focuses on protein filtration. (Citing RX-42 at KEL958871; Tr. at 663:13-18.) Analog claims that Dr. Ashurst's testimony demonstrates that the goal of Wang is far different than that of the '614 patent. (Citing Tr. at 663:19-664:4.) Analog further claims that Dr. Ashurst acknowledged that Wang does not discuss any application of any coatings at the wafer level. (Citing Tr. at 664:17-24.)

Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence that the combination of the '740 patent and Wang renders any of the asserted claims obvious.

Staff reiterates its argument that the '740 patent does not teach one of ordinary skill in the art how to perform a wafer-level vapor phase deposition process. Staff argues that there is no motivation to combine the '740 patent and Wang because Wang does not relate to anti-stiction treatments. (Citing RX-42 at 20; Tr. at 663:19-664:24.)

Discussion and Conclusion: Based on the evidence in the record, I find that

Respondents have failed to offer clear and convincing evidence that the combination of the '740 patent and Wang renders any of the asserted claims obvious.

Respondents rely on the '740 patent as the primary reference, and use Wang for selected limitations in each claim. All of the asserted claims require a wafer-level anti-stiction treatment process. In Section IV.B.5.b, *supra*, I found that the '740 patent failed to disclose an enabling disclosure of a wafer-level anti-stiction treatment process. Wang does not disclose wafer-level deposition, as the reference explains that the wafers are cut into chips before coating. (RX-42 at KEL958872; CX-239C at Q. 198; Tr. at 664:21-24.) Because the combination of the '740 patent and Wang fails to disclose all of the elements of any of the asserted claims, it does not render any of the asserted claims obvious. *Hearing Components*, 600 F.3d at 1373-1374; *Velander*, 348 F.3d at 1363.

In addition, I find that Respondents have failed to offer a sufficient reason to combine the '740 patent and Wang. The Federal Circuit has explained that "it remains appropriate for a post-*KSR* court considering obviousness 'to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.'" *Fresenius USA, Inc. v. Baxter Int'l, Inc.*, 582 F.3d 1288, 1300-1301 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418)). Respondents offer Dr. Ashurst's testimony that there was a reason to combine the two references. (RX-203C at Q. 206-208.) Specifically, Dr. Ashurst testified that the references "are…directed at technologies for applying organosiliane compounds to silicon substrates to manipulate the surface properties and address stiction utilizing vapor phase processing." (*Id.* at Q. 206.)

I find no evidence that Wang is addressing the anti-stiction problems addressed in either the '740 patent or the '614 patent. Wang states that "[o]ur immediate objective is to assemble a

monolayer of alcohol groups onto silicon filter surface for protein ultrafiltration." (RX-42 at KEL958871.) Wang explains that coatings are needed on the surface "in order to regulate hydrophilicity and minimize unspecific protein adsorption." (*Id.*) Dr. Ashurst's testimony on cross-examination supports Analog's position that Wang is not related to the anti-stiction processes of either the '740 patent or the '614 patent:

> Q. The objective of [Wang] is not to create a monolayer that reduces stiction, correct?
> A. It may not be their intent.
>
> Q. In fact, what they want to do is put a hydrophilic layer on this surface, right?
> A. Again, ultimately, yes.
>
> Q. Right. And a hydrophilic layer is opposite what you want in a stiction setting, where you want a hydrophobic layer, right?
> A. Potentially, yes.
>
> Q. And hydrophilic and hydrophobic are exact opposites of each other, right?
> A. Well, they are descriptors of the continuum.
>
> Q. All right. A description of hydrophilic means that it is something that attracts water, and hydrophobic means something that repels water, right?
> A. That's one interpretation.
>
> Q. That is a standard interpretation, right?
> A. Yes.

(Tr. at 663:19-664:16.) Dr. Miller's testimony further supports the finding that there is no reason to combine the '740 patent and Wang, as Dr. Miller opines that "[a] person of ordinary skill would have no motivation to combine or apply methods for minimizing protein absorption with the package-level anti-stiction treatments disclosed in the '740 patent." (CX-239C at Q. 198.)

c. The '740 Patent In View of Sakata

Respondents' Position: Respondents contend that the combination of the '740 patent and an article entitled "Anti-Stiction Silanization Coating to Silicon Micro-Structures by a Vapor Phase Deposition Process" by Jiro Sakata, Toshiyuki Tsuchiya, Atsuko Inoue, and Sanae

Tokumitsu ("Sakata") renders obvious asserted claims 12, 15, 31, 32, 34, 35, 38, and 39 of the '614 patent. Respondents argue that both references are directed at technologies for applying organosilane compounds to silicon substrates to manipulate the surface properties and address stiction utilizing vapor phase processing. (Citing RX-203C at Q. 203.)

Respondents arguments regarding the disclosures of the '740 patent have already been explained in Section IV.B.5.b, *supra* and will not be repeated. Respondents argue that the combination of the '740 patent and Sakata renders claim 12 obvious. Respondents claim that Sakata discloses the limitation of depositing the vaporized anti-stiction compound onto a wafer to coat the surface of the wafer, such that the coating has a thickness between 5 and 25 Angstroms. (Citing JX-33 at 2; RX-203C at Q. 220, 227.)

Respondents argue that the combination of the '740 patent and Sakata renders claim 15 obvious. Respondents assert that Sakata discloses a processing time for the deposition of FOTS. (Citing RX-203C at Q. 277.) Respondents claim that Sakata discloses the requirement that the anti-stiction compound is heated for a period of time between 1 and 60 minutes. (*Id.*)

Respondents argue that the combination of the '740 patent and Sakata renders claim 31 obvious for the same reasons as described with respect to claim 12. Respondents argue that the combination of the '740 patent and Sakata renders claim 32 obvious for the same reasons as described with respect to claim 15.

Respondents argue that the combination of the '740 patent and Sakata renders claim 34 obvious. Respondents claim that Sakata discloses treating a wafer with vapor at room temperature. (Citing RX-203C at Q. 433; JX-33.) Respondents assert that Sakata discloses that the vapor is deposited on the wafer surface. (Citing RX-203C at Q. 434.)

Respondents argue that the combination of the '740 patent and Sakata renders claim 35

obvious. Respondents assert that Sakata discloses the use of an organo silicon compound. (Citing RX-203C at Q. 463.)

Respondents argue that the combination of the '740 patent and Sakata renders claim 38 obvious. Respondents assert that Sakata discloses a monolayer coating with a thickness of between 5 and 20 Angstroms. (Citing RX-203C at Q. 490.)

Respondents argue that the combination of the '740 patent and Sakata renders claim 39 obvious. Respondents state that Sakata discloses a processing time of 10 minutes per cycle, with 1 to 6 cycles. (Citing RX-203C at Q. 520.)

In their reply brief, Respondents argue that Sakata is prior art because it was publicly available to a person of ordinary skill in the art prior to the filing date of the patents-in-suit. Respondents assert that Sakata was distributed to conference attendees at the "Transducers '99" conference held on June 7-10, 1999. (Citing RX-209 at Q. 4-9, 13-15.)

Respondents argue that Dr. Martin's testimony is insufficient to antedate the Sakata reference. Respondents argue that Dr. Martin's testimony does not provide enough detail and is not sufficiently corroborated.

Analog's Position: Analog contends that the combination of the '740 patent and Sakata does not render any of the asserted claims obvious.

Analog argues that Sakata is not prior art to the '614 patent. Analog claims that Respondents' evidence amounts to a showing that a single person received a copy of the paper at a conference in Japan. According to Analog, this is insufficient to demonstrate the public accessibility of Sakata prior to February 1, 2000. Analog argues that Dr. Ashurst knew the actual publication date of Sakata, but that Respondents' counsel withheld that information in his testimony. Analog asserts that Respondents have failed to offer evidence regarding how many

people attended the conference, how many copies of Sakata were distributed, to whom copies were distributed, and whether Sakata was presented at the conference. (Citing RX-209 at Q. 13-15.)

Even if Respondents prove that Sakata was publicly accessible as of June 1999, Respondents claim that Dr. Martin reduced his invention to practice by February 5, 1999. According to Analog, Dr. Martin testified that he had developed a wafer-level, vapor phase anti-stiction process in a box oven by February 5, 1999. (Citing CX-238C at Q. 32-34; CX-157C at Q. 78, 80.) Respondents argue that the February 1999 process practiced the asserted claims of the '614 patent.

In its reply brief, Analog argues that the combination of the '740 patent and Sakata does not disclose all of the claim elements. Analog claims that Sakata does not disclose the limitation requiring a coating thickness of 5-25 Angstroms. (Citing RIB at 92; CIB at 112-133.) Analog states that Sakata does not disclose heating the anti-stiction compound between 1 and 60 minutes. (Citing CX-239C at Q. 182.)

Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence that the combination of the '740 patent and Sakata renders any of the asserted claims of the '614 patent obvious.

Staff asserts that Sakata is not prior art. Staff claims that the evidence shows that the inventions of the asserted claims were reduced to practice prior to the asserted publication date of Sakata. (Citing CX-238C at Q. 13, 16-29.) Staff states that Dr. Martin's testimony regarding reduction to practice is corroborated by contemporaneous documents. (Citing CX-188C; CX-212C.) Staff argues that even if Sakata is considered prior art, there is no motivation to combine Sakata and the '740 patent. (Citing JX-34 at 27-28.)

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the combination of the '740 patent and Sakata render any of the asserted claims obvious.

The first issue to resolve is whether or not Sakata is prior art to the '614 patent. The Federal Circuit has addressed the meaning of the term "printed publication" in § 102, and found that public accessibility is the focus of the analysis. *In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986). The court has explained that:

> A document is publicly accessible if it "has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation."

Cordis Corp. v. Boston Scientific Corp., 561 F.3d 1319, 1333 (Fed. Cir. 2009) (quoting *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)). "Whether an asserted anticipatory document qualifies as a 'printed publication' under § 102 is a legal conclusion based on underlying factual determinations." *Cooper Cameron Corp. v. Kvaerner Oilfield Prods., Inc.*, 291 F.3d 1317, 1321 (Fed. Cir. 2002). Respondents bear the burden of demonstrating by clear and convincing evidence that Sakata qualifies as a "printed publication." *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 936-937 (Fed. Cir. 1990.)

The earliest priority date listed on the face of the '614 patent is February 1, 2000, and no party disputes that Analog is entitled to this priority date. There is nothing on the face of Sakata that indicates a publication date. (JX-33.) Respondents assert that Sakata was distributed as part of a "Transducers '99" conference that took place in Japan between June 7-10, 1999. To support that assertion, Respondents rely on the testimony of Dr. Michael Pedersen, a former Knowles employee who attended the Transducers '99 conference in Japan. (RX-209 at Q. 3-6.)

Dr. Pedersen testified that the conference is "one of the largest solid-state transducers conferences." (RX-209 at Q. 7.) He asserted that the conference "attracts people with research backgrounds in engineering and physics from universities, industry and government agencies, particularly individuals interested in the solid-state transducers field." (*Id.*) Dr. Pedersen testified that when he went to the conference, he received a printed book that included the Sakata paper. (*Id.* at Q. 9-10, 13-15.) Dr. Pedersen made clear that the book was distributed at the time of the conference to all registered attendees. (*Id.* at Q. 13, 15.) Dr. Pedersen's testimony was corroborated by his copy of the book, which contains his name written in his own handwriting. (*Id.* at Q. 10; RX-213.) The book's table of contents lists the Sakata paper, and the paper can be found on page 26 of the book. (RX-213.) I find that this evidence is sufficient to demonstrate that Sakata was a "printed publication" as of June 10, 1999, because Sakata was made publicly accessible to those of ordinary skill in the art in the relevant field as of at least that date. *Mass. Inst. of Tech. v. AB Fortia*, 774 F.2d 1104, 1108-1109 (Fed. Cir. 1985) (finding that a paper that was presented at a conference and distributed to interested attendees without any restriction constituted a "printed publication"); *Deep Welding, Inc. v. Sciaky Bros., Inc.*, 417 F.2d 1227, (7th Cir. 1969) (finding that papers distributed at conferences attended by those of ordinary skill in the art constituted printed publications).

Analog argues that even if Sakata is considered prior art, it has proven that Dr. Martin reduced his invention to practice prior to June 1999. Analog asserts that Dr. Martin reduced his invention to practice by February 5, 1999. If true, Dr. Martin's February 5, 1999 reduction to practice would antedate Sakata, meaning that it could not be considered prior art to the '614 patent. *See Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576-1577 (Fed. Cir. 1996).

"In order to establish actual reduction to practice, the inventor must prove that he

constructed an embodiment or performed a process that met all the limitations of the claim, and that he determined that the invention would work for its intended purpose." *Slip Track Sys., Inc. v. Metal-Lite, Inc.*, 304 F.3d 1256, 1265 (Fed. Cir. 2002). "To prove reduction to practice by inventor testimony, the inventor's testimony must be corroborated by independent evidence." *Id.*

Analog relies on Dr. Martin's testimony to demonstrate a February 5, 1999 reduction to practice date. (*See generally* CX-238C.) Analog relies on two documents to corroborate Dr. Martin's testimony. The first document, CX-188C, contains meeting minutes from two meetings at Analog that took place in May and June of 1997. The document identifies the goal of the meetings was to "develop and qualify a wafer level treatment…" (CX-188C.) Dr. Martin's testimony confirms that at the time of this document, he had an idea for wafer-level processing, but "had not yet nailed down everything to make the process suitable for manufacture, or to prove that it would work." (CX-239C at Q. 22.) Thus, CX-188C cannot serve as corroboration of reduction to practice, as it offers no evidence that Dr. Martin had "determined that the invention would work for its intended purpose." *Slip Track Sys.*, 304 F.3d at 1265.

The second allegedly corroborating document is CX-212C. This is a three-page slide presentation entitled "WASA Status, Plans and Issues." (CX-212C.) At the bottom of each slide, it shows that Dr. Martin was the author of this presentation. (*Id.*) I find that this document, on its own, is not sufficient corroborating evidence because the document was authored by Dr. Martin. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, (Fed. Cir. 2006) ("As far as the corroborative value of the inventors' notebooks is concerned, they were not witnessed, and they do not provide an 'independent' source of authority on the issue of reduction to practice. Hence, they have minimum corroborative value."); *Hahn v. Wong*, 892 F.2d 1028, 1032 (Fed. Cir. 1989) ("The inventor, however, must provide independent corroborating

evidence in addition to his own statements and documents.") Because Analog offers no independent evidence to corroborate Dr. Martin's testimony, I find that Analog has failed to demonstrate that the asserted claims are entitled to a February 5, 1999 reduction to practice date.[16] Therefore, Sakata shall be considered prior art to the '614 patent.

I find that Respondents have not offered a sufficient reason regarding why one of ordinary skill in the art would combine the '740 patent and Sakata. *Fresenius*, 582 F.3d at 1300-1301. The '740 patent is directed to a die-level vapor deposition process, and includes a single sentence that mentions wafer-level treatment. (JX-34 at 1:49-2:26, 5:30-32.) I have found in Section IV.B.5.b, *supra* the '740 patent does not provide an enabling disclosure of a wafer-level vapor deposition process as claimed in the '614 patent. In contrast, Sakata discloses a wafer-level vapor deposition process. (JX-33.)

Dr. Ashurst believes that there is a reason to combine these two references because "they are...directed at technologies for applying organosilane compounds to silicon substrates to manipulate the surface properties and address stiction utilizing vapor phase processing." (RX-203C at Q. 206.) Dr. Ashurst's opinion fails to take into account the difference between the die-level process of the '740 patent and the wafer-level process of Sakata. As Dr. Miller notes, Sakata "does not address package-level processing and discusses the use of equipment and materials that would have no application for the processes described in the '740 Patent." (CX-239C at Q. 205.) When addressing the '740 patent, Dr. Miller testified that "wafer-level vapor phase deposition methods presented numerous complicating factors that were not applicable to die-level and liquid-based treatments." (*Id.* at Q. 179.) Such complicating factors were discussed in detail in Section IV.B.5.b *supra*. Because of the differences between die-level

[16] Analog also cites to JX-42C, but the earliest date on that document is September 8, 1999, meaning that it cannot serve as evidence of reduction to practice prior to June 1999. (JX-42C at ANALOG00003461.)

vapor deposition processes and wafer-level vapor phase deposition processes, I find that one of ordinary skill in the art would not have a reason to combine the '740 patent and Sakata.

In addition, Respondents rely on the '740 patent as disclosing a wafer-level anti-stiction process. (*See* RIB at 91-93, 96-98, 101, 106-108, 110, 112-113.) In Section IV.B.5.b, *supra*, I found that the '740 patent failed to disclose an enabling disclosure of a wafer-level anti-stiction treatment process. Because Respondents rely on the '740 patent to disclose a wafer-level process, I find that they have failed to demonstrate that the combination of the '740 patent and Sakata discloses all of the elements of any of the asserted claims. *Hearing Components*, 600 F.3d at 1373-1374; *Velander*, 348 F.3d at 1363.

d. The '740 Patent In View of The '767 Patent

Respondents' Position: Respondents contend that the combination of the '740 patent and the '767 patent renders obvious claims 15, 31, and 32 of the '614 patent.

Respondents assert that to the extent that the '740 patent does not disclose wafer-level processing, this processing is explicitly disclosed in the '767 patent. (Citing RX-203C at Q. 263.) Respondents claim that to the extent that the '767 patent does not disclose the use of an oven, this use is explicitly disclosed in the '740 patent. (*Id.*) The recitation of Respondents' position regarding the disclosures of the '740 patent and the '767 patent, found in Section IV.B.5, *supra*, will not be repeated.

In their reply brief, Respondents argue that one of ordinary skill in the art would look to the '767 patent because it discloses vapor deposition of monolayers on MEMS-related substrates in order to control surface properties. (Citing RX-203C at Q. 442.) Respondents note that Analog suggests that one of ordinary skill in the art would not be motivated to combine the '767 patent with other references because it discloses the use of an aluminum rather than a silicon

substrate. Respondents argue that this position ignores the fact that Dr. Martin identified the '454 patent, which discloses an anti-stiction coating process on an aluminum substrate, to the Patent Office during prosecution. (Citing JX-3 at ANALOG00006252.) Respondents assert that the patent defines "wafer" broadly to encompass not only silicon but any clean inorganic surface, including aluminum. (Citing JX-1 at 4:33-35, 14:57-62.) Respondents assert that because the '767 patent addresses the same problem as the '614 patent, there would be a motivation to combine it with other references to reach the invention of the '614 patent. (Citing RX-20 at 4:30-33.)

Analog's Position: Analog contends that Respondents failed to offer clear and convincing evidence that the combination of the '767 patent and the '740 patent renders any of the asserted claims obvious.

Analog argues that there is no reason that one of ordinary skill in the art would combine the '740 patent and the '767 patent. Analog claims that the '767 patent relates only to aluminum-based devices, while the '740 patent relates to silicon-based devices. (Citing RX-20 at 2:21-22; Tr. at 438:15-18.) Analog asserts that the manufacturing process for aluminum-based devices involves different consideration than silicon-based devices. (Citing Tr. at 438:19-23, 322:20-323:8.)

Analog asserts that the anti-stiction compounds that are purportedly incorporated by reference into the '767 patent would not survive the high temperatures associated with silicon-based manufacturing processes. (Citing Tr. at 485:19-486:1.) Analog claims that the '740 patent disclaims materials that have insufficient thermal stability under the high temperatures associated with the packaging of silicon-based devices. (Citing JX-34 at 1:40-43.) Analog states that the '740 patent discloses that temperatures may reach 430°C, which is well above the temperature at

which PFPE compounds begin to decompose. (Citing JX-34 at 1:43-45.)

In its reply brief, Analog asserts that Respondents do not offer any motivation to combine the '740 patent and the '767 patent. (Citing RIB at 93-95.) According to Analog, Respondents' obviousness argument must fail due to a lack of motivation to combine.

Staff's Position: Staff contends that Respondents failed to offer clear and convincing evidence that the combination of the '767 patent and the '740 patent renders asserted claims 15 and 32 obvious.

Staff claims that there is no motivation to combine the two references. Staff states that the '454 patent never describes a method of passivating MEMS wafers. (Citing Tr. at 644:13-20, 645:16-20.) Staff states that the '740 patent only contains a single sentence that mentions wafer-level passivation and does not address the problems associated with wire bonding and die attachment that are encountered with coating wafers that contain a plurality of die. (Citing Tr. at 667:7-17, 654:2-6, 654:9-13, 669:4-21.)

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the combination of the '740 patent and the '767 patent renders any of the asserted claims obvious.

Respondents' argument relies on their belief that the '767 patent incorporates by reference the '374 and '454 patents. (*See* RIB at 93-95.) In Section IV.B.5.a *supra*, I concluded that neither the '374 patent nor the '454 patent were properly incorporated by reference into the '767 patent. Moreover, I found that '767 patent fails to disclose multiple elements of asserted claims 12, 15, 31, and 32, including inserting wafers into an oven or furnace, removing the treated wafer from the oven or furnace, and heating a compound having anti-stiction properties. In Section IV.B.5.b *supra*, I concluded that the '740 patent failed to provide an enabling

disclosure of a wafer-level vapor deposition process, and thus does not disclose any of the claim limitations requiring the treatment of a wafer.

For these reasons, the combination of the '740 patent and the '767 patent fails to disclose at least the claim elements of inserting a wafer into an oven or furnace and removing a treated wafer from the oven or furnace. Therefore, the proposed combination does not render obvious claims 15, 31, and 32 of the '614 patent. *Hearing Components*, 600 F.3d at 1373-1374; *Velander*, 348 F.3d at 1363.

In addition, I find that Respondents failed to offer any argument regarding a reason to combine the '740 patent and the '767 patent. Respondents' initial post-hearing brief makes no mention of a reason to combine when discussing the combination of the '740 patent and the '767 patent. (RIB at 93-95, 101.) Respondents therefore have waived the ability to raise such an argument. (*See* Ground Rule 11.1.) Because Respondents have made no attempt to assert that there is a reason to combine the '740 patent and the '767 patent, I find that they have failed to meet their burden. Merely demonstrating that all of the elements of a patent claim can be found in a combination of prior art references is not enough to prove obviousness. As the Supreme Court explained:

> As is clear from cases such as *Adams,* a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.

KSR, 550 U.S. at 418-419.

e. The '767 Patent In View of Wang

Respondents' Position: Respondents contend that the combination of the '767 patent and Wang renders obvious claims 34, 35, 38, and 39 of the '614 patent.

Regarding claim 34, Respondents assert that the '767 patent discloses the production of MEMS devices using a wafer-level method for stiction reduction. (Citing RX-203C at Q. 410; RX-20 at 1:6-9.) Respondents assert that the combination discloses the requirement that the wafer, substantially at room temperature, is exposed to the vapor of an anti-stiction compound. (Citing RX-203C at Q. 411; RX-20 at 1:6-9, 4:30-33; RX-42 at 23.) Respondents assert the combination discloses depositing the vapor on the wafer surface. (Citing RX-203C at Q. 412; RX-42 at 23.) Respondents claim that the combination discloses sawing the wafer after deposition. (Citing RX-203C at Q. 413; JX-20 at 1:16-21, 4:30-33, 4:44-45.)

Regarding claim 35, Respondents assert that Wang discloses the use of an organo silicon compound. (Citing RX-203C at Q. 445; RX-42 at 20.) Regarding claim 38, Respondents claim that both the '374 patent (incorporated by reference into the '767 patent) and Wang disclose that the thickness of the layer on the surface of the wafer is between 5 and 25 Angstroms. (Citing RX-15 at 5:54-58, 7:9-11; RX-42 at 23.) Regarding claim 39, Respondents argue that Wang discloses that the step of exposing the wafer to the vapor takes between 1 and 60 minutes. (Citing RX-42 at 21, 23; RX-203C at Q. 503.)

In their reply brief, Respondents reiterate that there is a motivation to combine the '767 patent and Wang. Respondents note that the Wang '026 patent is based upon the same information as is included in the Wang reference, and that the Wang '026 patent was cited during the prosecution of the '614 patent. (Citing JX-3 at ANALOG00006445.) Respondents assert that Wang addresses the very same problem addressed in the '614 patent – preventing stiction in

MEMS devices. (Citing RX-42 at 20.)

Respondents argue that one of ordinary skill in the art would look to the '767 patent because it discloses vapor deposition of monolayers on MEMS-related substrates in order to control surface properties. (Citing RX-203C at Q. 442.) Respondents note that Analog suggests that one of ordinary skill in the art would not be motivated to combine the '767 patent with other references because it discloses the use of an aluminum rather than a silicon substrate. Respondents argue that this position ignores the fact that Dr. Martin identified the '454 patent, which discloses an anti-stiction coating process on an aluminum substrate, to the Patent Office during prosecution. (Citing JX-3 at ANALOG00006252.) Respondents assert that the patent defines "wafer" broadly to encompass not only silicon but any clean inorganic surface, including aluminum. (Citing JX-1 at 4:33-35, 14:57-62.) Respondents assert that because the '767 patent addresses the same problem as the '614 patent, there would be a motivation to combine it with other references to reach the invention of the '614 patent. (Citing RX-20 at 4:30-33.)

Analog's Position: Analog contends that the combination of the '767 patent and Wang fails to render any of the asserted claims of the '614 patent obvious.

Analog argues that there is no motivation to combine the '767 patent and Wang because Wang does not relate to anti-stiction treatments. Analog claims that Wang instead focuses on protein filtration. (Citing RX-42 at KEL958871; Tr. at 663:13-18.) Analog claims that Dr. Ashurst's testimony demonstrates that the goal of Wang is far different than that of the '614 patent. (Citing Tr. at 663:19-664:4.) Analog further claims that Dr. Ashurst acknowledged that Wang does not discuss any application of any coatings at the wafer level. (Citing Tr. at 664:17-24.)

Analog argues that there is no reason that one of ordinary skill in the art would look to

the '767 patent. Analog claims that the '767 patent relates only to aluminum-based devices, while Wang relates to silicon-based devices. (Citing RX-20 at 2:21-22; Tr. at 438:15-18.) Analog asserts that the manufacturing process for aluminum-based devices involves different consideration than silicon-based devices. (Citing Tr. at 438:19-23, 322:20-323:8.) Analog asserts that the anti-stiction compounds that are purportedly incorporated by reference into the '767 patent would not survive the high temperatures associated with silicon-based manufacturing processes. (Citing Tr. at 485:19-486:1.)

In its reply brief, Analog asserts that Respondents do not offer any motivation to combine the '767 patent and Wang. (Citing RIB at 101-102, 107, 109, 111.) According to Analog, Respondents' obviousness argument must fail due to a lack of motivation to combine.

Staff's Position: Staff contends that Respondents have failed to offer clear and convincing evidence that the combination of the '767 patent and Wang renders claims 34, 35, 38, and 39 of the '614 patent obvious.

Staff claims that the '767 patent fails to teach separating wafers that have first undergone passivation. (Citing Tr. at 644:13-20, 645:16-20.) Staff argues that because Wang does not relate to a process for providing an anti-stiction treatment, one of ordinary skill in the art would not be motivated to combine it with the '767 patent. (Citing RX-42 at 20; Tr. at 663:19-664:24.) In its reply brief, Staff argues that neither the '767 patent nor Wang discloses a wafer-level anti-stiction process. (Citing Tr. at 644:13-20, 645:16-20, 469:21-472:15, 664:21-24.)

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the combination of the '767 patent and Wang renders any of claims 34, 35, 38, and 39 obvious.

I find that Respondents have failed to offer a sufficient reason to combine the '767 patent

and Wang. The Federal Circuit has explained that "it remains appropriate for a post-*KSR* court considering obviousness 'to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.'" *Fresenius*, 582 F.3d at 1300-1301 (quoting *KSR*, 550 U.S. at 418)). Respondents offer Dr. Ashurst's testimony that there was a reason to combine the two references. (RX-203C at Q. 408.) Dr. Ashurst states that "one of skill in the art would be motivated to combine the references because they are both disclose [*sic*] vapor deposition of monolayers on MEMS related substrates in order to control surface properties." (*Id.*)

I find no evidence that Wang is addressing the anti-stiction problems addressed in either the '767 patent or the '614 patent. Wang states that "[o]ur immediate objective is to assemble a monolayer of alcohol groups onto silicon filter surface for protein ultrafiltration." (RX-42 at KEL958871.) Wang explains that coatings are needed on the surface "in order to regulate hydrophilicity and minimize unspecific protein adsorption." (*Id.*) Dr. Ashurst's testimony on cross-examination supports Analog's position that Wang is not related to the anti-stiction processes of either the '740 patent or the '614 patent:

> Q. The objective of [Wang] is not to create a monolayer that reduces stiction, correct?
> A. It may not be their intent.
>
> Q. In fact, what they want to do is put a hydrophilic layer on this surface, right?
> A. Again, ultimately, yes.
>
> Q. Right. And a hydrophilic layer is opposite what you want in a stiction setting, where you want a hydrophobic layer, right?
> A. Potentially, yes.
>
> Q. And hydrophilic and hydrophobic are exact opposites of each other, right?
> A. Well, they are descriptors of the continuum.
>
> Q. All right. A description of hydrophilic means that it is something that attracts water, and hydrophobic means something that repels water, right?

A. That's one interpretation.

Q. That is a standard interpretation, right?
A. Yes.

(Tr. at 663:19-664:16.) Dr. Miller's testimony further supports the finding that there is no reason to combine the '767 patent and Wang, as Dr. Miller opines that "[a] person of ordinary skill would have no motivation to combine or apply methods for minimizing protein absorption with the wafer-level processing steps discussed in the '767 patent." (CX-239C at Q. 204.)

f. The '767 Patent In View of Sakata

Respondents' Position: Respondents contend that the combination of the '767 patent and Sakata renders obvious asserted claims 34, 35, 38, and 39 of the '614 patent.

With regard to claim 34, Respondents argue that the '767 patent discloses the production of MEMS devices using a wafer-level method for stiction reduction. (Citing RX-203C at Q. 417; RX-20 at 1:6-9.) Respondents state that the combination discloses the step of exposing the wafer, substantially at room temperature, to the vapor of an anti-stiction compound. (Citing RX-203C at Q. 418; RX-20 at 1:6-9, 4:30-33; JX-33.) Respondents assert that the combination discloses the step of depositing vapor on the wafer surface. (*Id.*) Respondents assert that the '767 patent discloses sawing the wafer after the deposition of the anti-stiction compound. (Citing RX-203C at Q. 420; RX-20 at 4:30-33, 4:44-45.)

Regarding claim 35, Respondents assert that Sakata discloses the use of an organo silicon compound. (Citing RX-203C at Q. 451; JX-33.) Regarding claim 38, Respondents assert that the combination discloses coating the surface of the wafer with a layer that has a thickness between 5 and 25 Angstroms. (Citing RX-15 at 5:54-58, 7:9-11; JX-33; RX-203C at Q. 478.) Regarding claim 39, Respondents state that the combination discloses that the step of exposing the wafer to the vapor lasts for a period between 1 and 60 minutes. (Citing RX-203C at Q. 509.)

In their reply brief, Respondents assert that Sakata is prior art to the '614 patent. These arguments have been described *supra*, and will not be repeated.

Analog's Position: Respondents contend that the combination of the '767 patent and Sakata fails to render asserted claims 34, 35, 38, and 39 of the '614 patent obvious.

Analog argues that Sakata is not prior art to the '614 patent because Respondents have failed to demonstrate that Sakata is a "printed publication," and because Analog has demonstrated that Dr. Martin reduced his invention to practice by February 1999. These arguments have been described *supra*, and will not be repeated.

Analog argues that there is no reason that one of ordinary skill in the art would look to the '767 patent. Analog claims that the '767 patent relates only to aluminum-based devices, while Sakata relates to silicon-based devices. (Citing RX-20 at 2:21-22; Tr. at 438:15-18.) Analog asserts that the manufacturing process for aluminum-based devices involves different consideration than silicon-based devices. (Citing Tr. at 438:19-23, 322:20-323:8.) Analog asserts that the anti-stiction compounds that are purportedly incorporated by reference into the '767 patent would not survive the high temperatures associated with silicon-based manufacturing processes. (Citing Tr. at 485:19-486:1.)

In its reply brief, Analog asserts that Respondents do not offer any motivation to combine the '767 patent and Sakata. (Citing RIB at 102-104, 107-108, 109-110, 111-112.) According to Analog, Respondents' obviousness argument must fail due to a lack of motivation to combine.

Staff's Position: Staff contends that the combination of the '767 patent and Sakata fails to render asserted claims 34, 35, 38, and 39 of the '614 patent obvious.

Staff argues that Sakata is not prior art to the '614 patent because Respondents have failed to demonstrate that Sakata is a "printed publication," and because Analog has

demonstrated that Dr. Martin reduced his invention to practice by February 1999.

Staff further argues that there is no motivation to combine the '767 patent and Sakata. According to Staff, the '767 patent does not describe separating wafers after they have been treated by a passivation process. Staff states that Sakata fails to teach one of ordinary skill in the art the steps of exposing wafer substantially at room temperature to vapor from an anti-stiction compound, depositing the vapor on the wafer surface, and then separating the wafers into individual devices.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that 34, 35, 38, and 39 of the '614 patent are obvious in light of the combination of the '767 patent and Sakata.

The combination of the '767 patent and Sakata discloses a method for imparting anti-stiction properties to microelectromechanical devices derived from a wafer. Specifically, the '767 patent discloses imparting anti-stiction properties to a wafer of DMDs, and a DMD is a type of microelectromechanical device. (RX-20 at 4:26-39, 5:18-32; RX-203C at Q. 417-418; Tr. at 438:15-18.) Sakata discloses imparting anti-stiction properties to a wafer of silicon micro-structures. (JX-33 at KEL957938-39.)

Sakata discloses exposing the wafer, substantially at room temperature, to the vapor of a compound having anti-stiction properties. (JX-33 at KEL957938-39.) Sakata discloses a process of exposing the wafer to the vapors of 1,1, 2,2-tetrahydroperfluorooctyltrichlorosilane. (*Id.* at KEL957939; RX-203C at Q. 418.) Sakata discloses performing the coating of the wafers at room temperature. (JX-33 at KEL957939; RX-203C at Q. 418.) Sakata explains that the "dry coating" process using vapor[17] reduces stiction. (JX-33 at KEL957939-41.) Both Sakata and the '767 patent disclose that the wafer has a plurality of microelectromechanical devices fabricated

[17] Sakata distinguishes between a "dry process" using vapor and a "wet process." (JX-33 at KEL957938.)

on the wafer surface. (JX-33 at KEL957938; RX-20 at 4:26-39; RX-203C at Q. 418.) Sakata discloses that the vapor is deposited on the wafer surface after treatment at room temperature. (JX-33 at KEL957939; RX-203C at Q. 419.)

The combination of the '767 patent and Sakata fails to disclose the limitation in claim 34 requiring "sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step." Sakata makes no reference to sawing. (JX-33.)

Respondents rely on the '767 patent for the sawing limitation. (RX-203C at Q. 420.) The sawing limitation requires "sawing said treated wafer to form a plurality of microelectromechanical devices..." I construed sawing to mean "cutting." The '767 patent does not disclose cutting a treated wafer to form a plurality of MEMS devices. The '767 patent instead discloses separating the treated wafer by inscribing separation lines on the wafer surface and then applying pressure to break the wafer along the separation lines. (RX-20 at 3:40-62, 4:44-67.)[18] Therefore, the wafer is not separated into MEMS devices via cutting; the wafer is separated through a two-step inscribing and breaking process.

The '767 patent includes a brief reference to sawing in the Background of the Invention,

> Depending on the nature of the die, problems can arise during the separation of the wafer into die. Many conventional separation methods involve some sort of sawing, which is a "wet" process likely to cause damage to liquid-sensitive elements. Also, the separation can result in contamination of the die by debris resulting from the separation process. Some die are more susceptible to these types of damage than others, especially die having micromechanical elements that must have freedom of motion.

(RX-20 at 1:18-26.)

This passage clearly teaches away from the use of sawing, as it focuses on the problems

[18] While the inscribing may be performed by "sawing with a rotating blade," this is not "sawing" as contemplated by claim 34, as the action described in the '767 patent only creates separation lines in the wafer and does not actually separate the wafer into a plurality of devices. (RX-20 at 3:40-62.)

that arise with the sawing process. *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) ("A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.") Because the '767 patent teaches away from sawing, the combination of the '767 patent and Sakata fail to render the claims obvious. *KSR*, 550 U.S. at 416 (explaining that "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.")

Even if the '767 patent is not found to teach away from the sawing limitation, it still fails to disclose the sawing limitation from claim 34. There is no disclosure of sawing a wafer treated with an anti-stiction compound. (RX-20 at 1:18-26.) The only discussion of singulation of a treated wafer involves the disclosure of inscribing and breaking the wafer as described *supra*. (RX-20 at 4:44-67.)

Based on the foregoing, I find that Respondents have failed to offer clear and convincing evidence that the combination of the '767 patent and Sakata renders claim 34 obvious. Claims 35, 38, and 39 all depend from claim 34, and are not obvious for the same reasons as discussed with respect to claim 34. *See In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992).

Assuming *arguendo* that the combination of the '767 patent and Sakata renders claim 34 obvious, I find that the combination of the '767 patent and Sakata renders claim 35 obvious. Claim 35 requires that the anti-stiction compound is an "organo silicon compound." Respondents offer credible testimony from Dr. Ashurst that Sakata discloses use of an organo silicon compound as the anti-stiction compound. (RX-203C at Q. 451.) This testimony is not

rebutted by Dr. Miller. (CX-239C at Q. 206.)

Assuming *arguendo* that the combination of the '767 patent and Sakata renders claim 34 obvious, I find that the combination of the '767 patent and Sakata fails to render claim 38 obvious. Claim 38 adds the requirement that the treated wafer includes a surface coating with a thickness between 5 and 25 Angstroms. Respondents rely on the '374 patent for this limitation, asserting that the '374 patent is incorporated by reference into the '767 patent. (RX-203C at Q. 478.) I have already concluded in Section IV.B.5.a *supra*, that the '374 patent is not incorporated by reference into the '767 patent. Thus, Respondents' reliance on the '374 patent is misplaced.

Respondents also claim that Sakata discloses the limitation of claim 38 because Sakata discloses a monolayer, thereby inherently having a thickness between 5-20 Angstroms. (RX-203C at Q. 478, 481.) The portion of Sakata quoted by Dr. Ashurst does not use the term "monolayer." (*Id.*) Even if Sakata does disclose a monolayer, Respondents fail to offer clear and convincing evidence that the alleged monolayer of Sakata is inherently known to have a thickness of between 5-20 Angstroms. (*Id.*) Moreover, Dr. Miller offered credible testimony that calls into question whether one of ordinary skill in the art would necessarily know that Sakata discloses the claim limitation of claim 38. (CX-239C at Q. 180.)

Assuming *arguendo* that the combination of the '767 patent and Sakata renders claim 34 obvious, I find that the combination of the '767 patent and Sakata renders claim 39 obvious. Claim 39 requires that the wafer is exposed to vapor for a period between 1 and 60 minutes. Dr. Ashurst offers credible testimony that the limitation of claim 39 is disclosed in Sakata. (RX-203C at Q. 509.) This testimony is not rebutted by Dr. Miller. (CX-239C at Q. 210.)

g. Secondary Considerations

Neither Analog nor Staff offers any evidence of secondary considerations.

C. The '942 Patent[19]

1. Invalidity Under 35 U.S.C. § 112

Respondents argue that the asserted claims of the '942 patent are invalid based on a failure to meet the best mode, written description, enablement, and definiteness requirements of 35 U.S.C. § 112. Respondents claim that their arguments are identical to the arguments raised with respect to the '614 patent. (*See* RIB at 120-121.) For the reasons discussed in Sections IV.B.1-4 *supra* with respect to the '614 patent, I find that Respondents have not demonstrated that the asserted claims of the '942 patent are invalid based on failure to meet any of the requirements of 35 U.S.C. § 112.

2. Anticipation

a. The '767 Patent

Respondents' Position: Respondents contend that the '767 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, and 8 of the '942 patent.

Regarding claim 1, Respondents assert that the '767 patent discloses all of the claim limitations, and relies on its analysis of the '767 patent from the '614 patent anticipation argument. (Citing RX-203C at Q. 530-535.) Respondents rely on the '454 and '374 patents for their anticipation analysis, as they contend that those two patents are incorporated by reference into the '767 patent. (Citing RX-25 at 3:19-24; RX-15 at 5:49-58, 7:7-11.)

Regarding claim 2, Respondents assert that the '767 patent discloses all of the claim limitations, and relies on its analysis of the '767 patent from the '614 patent anticipation

[19] Because the asserted claims of the '614 patent and '942 patent share many elements in common, the parties arguments from the '614 patent claims that apply equally to the '942 patent claims will not be repeated.

argument. (Citing RX-203C at Q. 557-560.) Respondents assert that the '767 patent, through incorporation by reference, discloses an anti-stiction compound having organic content. (Citing RX-203C at Q. 558; Tr. at 292:1-7.)

Regarding claim 3, Respondents argue that the '767 patent, through incorporation by reference, discloses the deposition of a vapor of a compound having anti-stiction properties on the surface of the wafer so as to treat the surface and coat it with the compound to a thickness between 5 and 25 Angstroms. (Citing JX-20 at 1:53-58, 4:5-11; RX-15 at 7:9-11; RX-203C at Q. 578.) Regarding claim 4, Respondents assert that the '767 patent, through incorporation by reference, discloses treating the wafer surface with a compound effective to passivate the surface. (Citing RX-25 at 1:53-58; RX-15 at 6:66-7:6.)

Regarding claim 5, Respondents claim that the '767 patent, through incorporation by reference, discloses a treatment that imparts hydrophobic properties to the plurality of MEMS devices. (Citing RX-203C at Q. 610.) Regarding claim 6, Respondents state that the '767 patent, through incorporation by reference, discloses a treatment that reduces the surface energy of the surfaces of the MEMS devices. (Citing RX-203C at Q. 623.) Regarding claim 8, Respondents assert that the '767 patent, through incorporation by reference, discloses a method that results in an organo-metallic surface on the plurality of MEMS devices. (Citing RX-203C at Q. 637.)

Analog's Position: Analog contends that the '767 patent fails to anticipate any of the asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Staff's Position: Staff contends that the '767 patent fails to anticipate any of the asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that the '767 patent anticipates any asserted claim in the '942 patent.

In Section IV.B.5.a *supra*, which is hereby incorporated by reference, I found that the '454 and '374 patents are not properly incorporated by reference into the '767 patent. Because Respondents' anticipation argument relies on the '454 and '374 patents, I find that Respondents have failed to present clear and convincing evidence that the '767 patent anticipates any of the asserted claims of the '942 patent. Specifically, the '767 patent fails to clearly disclose at least the "heating" and "depositing" limitations of claim 2. (RX-20 at 5:18-32.)

Assuming, *arguendo*, that the '454 and '374 patents are properly incorporated by reference into the '767 patent, Respondents have failed to offer clear and convincing evidence that the '767 patent anticipates any of the asserted claims of the '614 patent.

The '767 patent teaches a method of separating a wafer into a die whereby there is at least one wafer-level process performed prior to separation. (RX-20 at 1:45-62.) An example of a wafer-level processing step is "passivation," which the '767 patent explains is a process that "prevents or cures sticking between contacting surfaces[.]" (*Id.* at 4:30-33.) The '767 patent provides further detail regarding passivation when it explains:

> In general, this passivation step 23 is any wafer-level step performed to unstick any mirrors that are stuck in a tilted position, or to reduce the likelihood that the mirrors will stick. Various passivation techniques are possible, such as application of lubricative coatings, drying, and cleaning. Many passivation methods are directed to reducing the surface energy of any contacting surfaces, such as the underside of the mirrors and their landing points.

(*Id.* at 5:18-26.) The '767 patent then incorporates by reference two documents – the '454 patent and the '374 patent – that disclose "[e]xamples of wafer-level passivation process [*sic*][.]" (*Id.* at

5:25-31.)[20]

I find that the '454 patent fails to disclose the wafer-level anti-stiction process of claims 1, 2, 3, 4, 5, 6, and 8. Each of the claims requires a wafer-level anti-stiction treatment, as each claim teaches treating the wafer and then sawing the wafer into individual microelectromechanical devices.

Notwithstanding the statement made in the '767 patent, I find that the '454 patent does not disclose a wafer-level anti-stiction treatment process. The '454 patent clearly discloses dividing the wafer into chips before passivation. (RX-25 at 2:51-53, 3:8-18.) As the patent explains, "[a] preferred method is to place the ***chips with the surfaces to be passivated*** fully exposed, and a small quantity of the source material to be used as the passivating material together in a covered glass container." (*Id.* at 3:9-13.) This conclusion is supported by the credible testimony of Dr. Miller. (CX-239C at Q. 131-132.)

Dr. Ashurst even acknowledged that the '454 patent does not disclose a wafer-level anti-stiction process. (Tr. at 644:17-645:20.) Respondents assert that Dr. Ashurst testified that it would be possible to use the anti-stiction process disclosed in the '454 patent on a wafer, and that one of ordinary skill in the art would know how to do so. (Tr. at 714:2-15.) The fact that one of ordinary skill in the art would know how to use the chip-level process of the '454 patent at the wafer level, even if true, is not sufficient to demonstrate anticipation. *Net MoneyIN, Inc.*, 545 F.3d at 1369 ("[I]n order to demonstrate anticipation, the proponent must show 'that the four corners of a single, prior art document describe every element of the claimed invention.'") (citation omitted).

The '374 patent fails to disclose the anti-stiction treatment of claims 1, 2, 3, 4, 5, 6, and 8

[20] To be clear, this finding is only made under the assumption that the Respondents successfully demonstrated that the '374 and '454 patents are in fact incorporated by reference into the '767 patent.

for the reasons described in Section IV.C.2.c, *infra*. Nothing in the '767 patent or '454 patent cures the deficiencies found in the '374 patent.

Based on the foregoing, I conclude that Respondents failed to offer clear and convincing evidence that the '767 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, or 8 the '942 patent.

b. The '740 Patent

Respondents' Position: Respondents contend that the '740 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, and 8 of the '942 patent.

Regarding claim 1, Respondents assert that the '740 patent discloses all of the claim limitations, and relies on its analysis of the '740 patent from the '614 patent anticipation argument. (Citing RX-203C at Q. 543-548.) Regarding claim 2, Respondents assert that the '740 patent discloses all of the claim limitations, and relies on its analysis of the '740 patent from the '614 patent anticipation argument. (Citing RX-203C at Q. 565-568.)

Regarding claim 3, Respondents assert that the '740 patent discloses a deposition of a monolayer, which would have a thickness in the range of 5-20 Angstroms. (Citing RX-203C at Q. 582.) Regarding claim 4, Respondents claim that the '740 patent discloses treating the surface with a compound effective to passivate the surface. (Citing RX-203C at Q. 597.) Regarding claim 5, Respondents state that the '740 patent discloses a treatment that imparts hydrophobic properties to the plurality of MEMS devices. (Citing RX-203C at Q. 614.)

Regarding claim 6, Respondents assert that the '740 patent discloses treating the surface with a compound that reduces the surface energy of the MEMS device. (Citing JX-34 at 5:17-25.) Regarding claim 8, Respondents claim that the '740 patent discloses the use of organo-silicons. (Citing RX-203C at Q. 640.)

Analog's Position: Analog contends that the '767 patent fails to anticipate any of the

asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Staff's Position: Staff contends that the '767 patent fails to anticipate any of the asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents failed to offer clear and convincing evidence that the '740 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, or 8 of the '942 patent.

In Section IV.B.5.b *supra*, which is hereby incorporated by reference, I found that the '740 patent does not include an enabling disclosure of a wafer-level vapor deposition process. Each of the asserted claims of the '942 patent claim a wafer-level vapor deposition process. Based on the foregoing, I find that the '740 patent fails to anticipate any of the asserted claims of the '942 patent.

c. The '374 Patent

Respondents' Position: Respondents contend that the '374 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, and 8 of the '942 patent.

Regarding claim 1, Respondents assert that the '374 patent discloses all of the claim limitations, and relies on its analysis of the '374 patent from the '614 patent anticipation argument. (Citing RX-204C at Q. 113-118.) Regarding claim 2, Respondents assert that the '374 patent discloses all of the claim limitations, and relies on its analysis of the '374 patent from the '614 patent anticipation argument. (Citing RX-203C at Q. 113-114, 117-118.)

Regarding claim 3, Respondents state that the '374 patent discloses the vapor deposition of the anti-stiction compound with a thickness between 5 and 100 Angstroms. (Citing RX-15 at 7:9-11; RX-204C at Q. 124-133.) Regarding claim 4, Respondents assert that the '374 patent

discloses the selection of acetal-rich PFPE compounds for deposition to and subsequent passivation of MEMS surfaces, followed by other PFPE compounds to form layers with improved stability. (Citing RX-15 at 7:27-35; RX-204C at Q. 134-137.) Regarding claim 5, Respondents assert that the '374 patent discloses the vapor deposition of PFPE for anti-stiction films on MEMS surfaces. (Citing RX-204C at Q. 138-141.)

Regarding claim 6, Respondents claim that the '374 patent discloses the vapor deposition of PFPE for anti-stiction films on MEMS surfaces. (Citing RX-204C at Q. 142-145.) Regarding claim 8, Respondents assert that the '374 patent discloses a method that results in an organo-metallic surface on the plurality of MEMS devices. (Citing RX-204C at Q. 146-149.)

Analog's Position: Analog contends that the '374 patent fails to anticipate any of the asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Staff's Position: Staff contends that the '374 patent fails to anticipate any of the asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Discussion and Conclusion: : Based on the evidence in the record, I find that Respondents failed to offer clear and convincing evidence that the '374 patent anticipates asserted claims 1, 2, 3, 4, 5, 6, or 8 of the '942 patent.

The '374 patent is entitled "PFPE coatings for micro-mechanical devices." (RX-15.) The '374 patent discloses using PFPE to prevent stiction on a micro-mechanical device: "[i]n the improved device, at least one, and preferably both, of the contacting portions of the elements have deposited thereon a film of perfluoropolyether (PFPE). The PFPE film is effective to ameliorate or prevent sticking or adhesion of the elements." (*Id.* at 2:51-55.)

The '374 patent explains that the deposition may be done at the wafer level: "[i]n the

case of fabricating DMD's 10, the process may be performed on an individual DMD 10, simultaneously on an array of DMD's 10, or on a wafer on which have been formed numerous DMD arrays, the wafer being eventually separated into chips, each having one array of DMD's 10." (RX-15 at 5:37-41.) The '374 patent discloses applying the PFPE through vapor deposition: "PFPE may be deposited as a vapor by vapor deposition at low pressure or by thermal evaporative techniques, as a fine mist or an aerosol or other sol produced by an appropriate mechanism such as a nebulizer or atomizer, or as a liquid film resulting from dipping or spinning." (*Id.* at 5:48-53.)

Asserted claim 1 requires that a wafer is inserted into and removed from one of an oven or a furnace. In Section IV.B.5.c *supra*, which is hereby incorporated by reference, I found that the '374 patent failed to clearly disclose the use of an oven or furnace in the deposition process. Based on the foregoing, I conclude that Respondents have failed to demonstrate that the '374 patent anticipates asserted claim 1.

Asserted claim 2 requires "heating a compound operative to imparte anti-stiction properties to a temperature sufficient to vaporize said compound, said compound having organic content[.]" I find that Respondents have failed to offer clear and convincing evidence that the '374 patent discloses a "compound having organic content." Respondents offer no explanation of how the '374 patent discloses this element. (RIB at 127-128.) At the hearing, I struck Dr. Wallace's invalidity opinion regarding claim 2 of the '942 patent. (Tr. at 8:1-9:10; Order No. 6.) By contrast, Analog's expert Dr. Miller offered the following testimony:

> The '374 Patent discloses the use of PFPE compounds as an anti-stiction agent. PFPE compounds consist largely of C-F and C-O bonds and do not qualify as "organic" molecules under the classical definition of the term, which requires at least one C-H bond.

(CX-239C at Q. 80.)

Based on Dr. Miller's testimony and Respondents' failure to offer evidence on the limitation that requires a "compound having organic content," I find that Respondents have failed to offer clear and convincing evidence that the '374 patent anticipates claim 2 of the '942 patent. Claims 3, 4, 5, 6, and 8 all depend on claim 2. Those claims are not anticipated by the '374 patent for the same reason as described with respect to claim 2. *See In re Royka*, 490 F.2d 981, 983-985 (C.C.P.A. 1974); *In re Fritch,* 972 F.2d 1260, 1266 (Fed. Cir. 1992).

3. Obviousness

a. Level of Ordinary Skill in the Art

The parties do not offer a separate definition of level of ordinary skill in the art for the '942 patent. For the reasons discussed with respect to the '614 patent, I find that a person of ordinary skill in the art would have a bachelor's degree in engineering or one of the physical sciences, a minimum of 1 year of experience with MEMS devices, and a general knowledge of the manufacturing of MEMS devices that would include an understanding of the effect of stiction on the reliability of MEMS devices.

b. The '740 Patent In View of The '767 Patent

Respondents' Position: Respondents contend that the combination of the '740 patent and the '767 patent renders obvious asserted claims 3 and 8 of the '942 patent. (Citing RX-203C at Q. 586-587.)

Analog's Position: Analog contends that the '374 patent fails to render obvious any asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Staff's Position: Staff contends that the '374 patent fails to render obvious any asserted claims of the '942 patent for the same reasons as discussed with respect to the '614 patent.

Discussion and Conclusion: Based on the evidence in the record, I find that Respondents have failed to offer clear and convincing evidence that claim 3 or claim 8 of the '942 patent is obvious in light of the combination of the '740 patent and the '767 patent. Claims 3 and 8 both depend on claim 2.

Respondents rely on Dr. Ashurst's testimony to support their obviousness argument. (RIB at 132-133.) As part of his obviousness opinion, Dr. Ashurst opines that the '740 patent and the '767 patent each disclose all of the elements of claim 2. (RX-203C at Q. 586-587, 645-646.) I have found that neither the '740 patent nor the '767 patent anticipates claim 2.

Based on the discussion found in Sections IV.C.2.a-b *supra*, I find that neither the '767 patent not the '740 patent disclose the step of "depositing said vapor on a surface of the wafer..." as required by claim 2. Thus, I find that Respondents' obviousness argument fails. *Hearing Components*, 600 F.3d at 1373-1374; *Velander*, 348 F.3d at 1363. Furthermore, I find that Respondents have failed to offer a sufficient reason why one of ordinary skill in the art would combine the '740 patent and the '767 patent, as Respondents' argument is based on the incorrect assumption that both the '740 patent and the '767 patent anticipate claim 2 of the '942 patent. (RIB at 132-133.)

c. Secondary Considerations

Neither Analog nor Staff offers any evidence of secondary considerations.

V. INFRINGEMENT

A. Applicable Law

A complainant must prove either literal infringement or infringement under the doctrine of equivalents. Infringement must be proven by a preponderance of the evidence. *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 859 F.2d 878, 889 (Fed. Cir. 1988). A preponderance

of the evidence standard "requires proving that infringement was more likely than not to have occurred." *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*, 418 F.3d 1326, 1341 n. 15 (Fed. Cir. 2005).

Literal infringement is a question of fact. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1332 (Fed. Cir. 2008). Literal infringement requires the patentee to prove that the accused device contains each and every limitation of the asserted claim(s). *Frank's Casing Crew & Rental Tools, Inc. v. Weatherford Int'l, Inc.*, 389 F.3d 1370, 1378 (Fed. Cir. 2004).

As for the doctrine of equivalents:

> Infringement under the doctrine of equivalents may be found when the accused device contains an "insubstantial" change from the claimed invention. Whether equivalency exists may be determined based on the "insubstantial differences" test or based on the "triple identity" test, namely, whether the element of the accused device "performs substantially the same function in substantially the same way to obtain the same result." The essential inquiry is whether "the accused product or process contain elements identical or equivalent to each claimed element of the patented invention[.]"

TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc., 529 F.3d 1364, 1376-77 (Fed. Cir. 2008) (citations omitted).

Thus, if an element is missing or not satisfied, infringement cannot be found under the doctrine of equivalents as a matter of law. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538-39 (Fed. Cir. 1991). Determining infringement under the doctrine of equivalents "requires an intensely factual inquiry." *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.*, 212 F.3d 1377, 1381 (Fed. Cir. 2000).

B. The '614 Patent

1. Claim 12

Claim 12 recites:

A method for producing microelectromechanical devices comprising the steps of:

inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into one of an oven or a furnace;

heating a compound having anti-stiction properties to a temperature sufficient to vaporize said compound;

depositing said vapor on a surface of said wafer to as to treat said surface with said compound and to coat said surface with said compound to a thickness between 5 and 25 Angstroms;

removing said treated wafer from said oven or furnace; and

sawing said wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, and wherein said depositing step is carried out before said sawing step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that Knowles' accused process infringes claim 12 of the '614 patent.

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Based upon the foregoing, I find that the Knowles process does not practice the sawing element of claim 12 of the 614 patent when viewed under the doctrine of equivalents.

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2. Claim 15

Claim 15 recites:

A method for producing microelectromechanical devices comprising the steps of:

inserting a wafer having fabricated thereon a plurality of microelectromechanical devices into one of an oven or a furnace;

heating a compound having anti-stiction properties within said oven or furnace for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize said compound;

depositing said vapor on a surface of said wafer so as to treat said surface with said compound;

removing said wafer from said oven or furnace; and

sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog failed to demonstrate that the accused Knowles process infringes claim 15.

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Based upon all of the foregoing, I find that assuming *arguendo* that the term "oven" is construed as proposed by Analog, the Knowles process would still not practice all of the limitations of claim 15.

3. Claim 31

Claim 31 recites:

Microelectromechanical devices produced by the steps of:

inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into one of an oven or a furnace;

heating a compound having anti-stiction properties to a temperature sufficient to vaporize said compound;

depositing said vapor on a surface of said wafer so as to treat said surface with said compound and to coat said surface with said compound to a thickness between 5 and 25 Angstroms;

removing said wafer from said oven or furnace; and

sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that the accused Knowles products infringe claim 31.

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I have already found that the Knowles process does not infringe claim 12, either literally or under the doctrine of equivalents, and I will not repeat that discussion here. I reaffirm my findings and rationale as set forth in Section V.B.1 *supra*. Based on the foregoing, I find that Knowles' accused products are not produced using the process described in claims 12 and 31, because the Knowles process does not "saw" the wafer to form a plurality of microelectro-mechanical devises. Therefore, Knowles' accused products do not infringe claim 31.

4. Claim 32

Claim 32 recites:

Microelectromechanical devices produced by the steps of:

[27] The elements of claims 12 and 31 are identical except for the use of the terms "said treated wafer" and "said wafer" which are positioned in reverse order in elements 3 and 4 of the two claims.

inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into one of an oven or a furnace;

heating a compound having anti-stiction properties within said oven for a period between 1 and 60 minutes above a predetermined temperature sufficient to vaporize said compound;

depositing said vapor on a surface of said wafer so as to treat said surface with said compound;

removing said wafer from said oven or furnace; and

sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

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Based upon the foregoing, I find that Knowles' accused products do not infringe claim 32 of the '614 patent.

5. Claim 34

Claim 34 recites:

A method for imparting anti-stiction properties to microelectromechanical devices derived from a wafer comprising the steps of:

exposing said wafer, substantially at room temperature, to the vapor of a compound having anti-stiction properties, wherein said wafer has a plurality of microelectromechanical devices fabricated on a surface thereof;

depositing said vapor on said wafer surface; and

sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that Knowles' accused process infringes claim 34.

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Based upon the foregoing, I find that the Knowles accused process does not infringe claim 34 of the 614 patent.

6. Claim 35

Claim 35 depends from claim 34 and recites:

The method of claim 34 wherein said compound is an organo silicon compound.

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7. Claim 38

Claim 38 depends from claim 34 and recites:

The method of claim 34 wherein said depositing step comprises the step of coating said surface with said compound to a thickness between 5 and 25 Angstroms.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that Knowles' accused process infringes claim 38.

I have previously found that Analog failed to prove infringement of claim 34. Claim 38 is dependent from claim 34. This leads to the conclusion that Analog has failed to demonstrate infringement of claim 38. *Wahpeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1552 n. 9 (Fed. Cir. 1989) ("One who does not infringe an independent claim cannot infringe a claim dependent on (and thus containing all the limitations of) that claim.")

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8. Claim 39

Claim 39 depends from claim 34 and recites:

The method of claim 34 wherein said step of exposing said wafer comprises the step of exposing said wafer to said vapor for a period between 1 and 60 minutes.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that Knowles' accused process infringes claim 39.

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}

C. The '942 Patent

1. Claim 1

Claim 1 recites:

A method for producing microelectromechanical devices comprising the steps of:

inserting a wafer having a plurality of microelectromechanical devices fabricated on a surface thereof into one of an oven or a furnace;

heating a compound having anti-stiction properties within said oven or furnace to a temperature sufficient to vaporize said compound;

depositing said vapor on said wafer surface so as to treat the surface of said wafer with said compound;

removing said wafer from said oven or furnace;

and sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has failed to demonstrate that the accused Knowles process infringes claim 1 of the '942 patent.

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2. Claim 2

Claim 2 recites:

A method for producing microelectromechanical devices from a wafer comprising the steps of:

heating a compound operative to imparte anti-stiction properties to a temperature sufficient to vaporize said compound, said compound having organic content;

depositing said vapor on a surface of the wafer having a plurality of microelectromechanical devices fabricated thereon so as to treat the surface of said wafer with said compound; and

separating said plurality of microelectromechanical devices on said treated wafer into discrete devices, wherein said depositing step is carried out before said separating step.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has demonstrated that the accused Knowles process infringes claim 2 of the '942 patent.

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3. Claim 3

Claim 3 depends from claim 2 and recites:

The method of claim 2, wherein said depositing step comprises the step of coating said surface to a thickness of between 5-100 Angstroms.

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Based upon the foregoing, I find that Knowles' accused process practices each and every limitation of every element of claim 3 and, therefore, Knowles' accused process infringes claim 3 of the '942 patent.

4. Claim 4

Claim 4 depends from claim 2 and recites:

> The method of claim 2, wherein said depositing step comprises the step of treating said surface with a compound effective to passivate said surface.

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Based upon the foregoing, I find that Knowles' accused process practices each and every limitation of every element of claim 4 and, therefore, Knowles' accused process infringes claim 4 of the '942 patent.

5. Claim 5

Claim 5 depends from claim 2 and recites:

> The method of claim 2, wherein said treatment imparts hydrophobic properties to the plurality of microelectromechanical devices.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has demonstrated that the accused Knowles process infringes claim 5 of the '942 patent.

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}

6. Claim 6

Claim 6 depends from claim 2 and recites:

The method of claim 2, wherein said treatment reduces the surface energy of the surfaces of the plurality of microelectromechanical devices.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has demonstrated that the accused Knowles process infringes claim 6 of the '942 patent.

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7. Claim 8

Claim 8 depends from claim 2 and recites:

The method of claim 2, said method resulting in an organo-metallic surface on the plurality of microelectromechanical devices.

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Discussion and Conclusion: Based on the evidence in the record, I find that Analog has demonstrated that the accused Knowles process infringes claim 8 of the '942 patent.

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VI. DOMESTIC INDUSTRY

A. Applicable Law

In patent-based proceedings under section 337, a complainant must establish that an industry "relating to the articles protected by the patent...exists or is in the process of being established" in the United States. 19 U.S.C. § 1337(a)(2) (2008). Under Commission precedent, the domestic industry requirement of Section 337 consists of an "economic prong" and a "technical prong." *Certain Data Storage Systems and Components Thereof*, Inv. No. 337-TA-471, Initial Determination Granting EMC's Motion No. 471-8 Relating to the Domestic Industry Requirement's Economic Prong (unreviewed) at 3 (Public Version, October 25, 2002).

The "economic prong" of the domestic industry requirement is satisfied when it is determined that the economic activities set forth in subsections (A), (B), and/or (C) of subsection 337(a)(3) have taken place or are taking place. *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, USITC Pub. No. 3003, 1996 ITC LEXIS 556, Comm'n Op. at 21 (Nov. 1996). With respect to the "economic prong," 19 U.S.C. § 1337(a)(2) and (3) provide, in full:

> (2) Subparagraphs (B), (C), (D), and (E) of paragraph (1) apply only if an industry in the United States, relating to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.
>
> (3) For purposes of paragraph (2), an industry in the United States

> shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned-
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

Given that these criteria are listed in the disjunctive, satisfaction of any one of them will be sufficient to meet the domestic industry requirement. *Certain Integrated Circuit Chipsets and Products Containing Same*, Inv. No. 337-TA-428, Order No 10, Initial Determination (Unreviewed) (May 4, 2000), citing *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Commission Op. at 15, USITC Pub. 3003 (Nov. 1996).

To meet the technical prong, the complainant must establish that it practices at least one claim of the asserted patent. *Certain Point of Sale Terminals and Components Thereof*, Inv. No. 337-TA-524, Order No. 40 (April 11, 2005). "The test for satisfying the 'technical prong' of the industry requirement is essentially same as that for infringement, i.e., a comparison of domestic products to the asserted claims." *Alloc v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). The technical prong of the domestic industry can be satisfied either literally or under the doctrine of equivalents. *Certain Excimer Laser Systems for Vision Correction Surgery and Components Thereof and Methods for Performing Such Surgery*, Inv. No. 337-TA-419, Order No. 43 (July 30, 1999).

B. Economic Prong

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(JX-49C at ¶¶ 8-15.)

Based on the foregoing stipulated facts, I find that Analog's significant investment in plant and equipment and substantial investment in engineering each satisfies the economic prong of the domestic industry requirement for both the '614 and '942 patents. 19 U.S.C. §§ 1337(a)(3)(A), (C) (2009).

C. Technical Prong

1. The '614 Patent

Analog's Position: Analog contends that its MEMS manufacturing process practices claim 12 of the '614 patent.

Analog states that its process comprises a method for producing microelectromechanical devices. (Citing CX-158C at Q. 310.) Analog states that the process involves inserting a wafer having a plurality of MEMS devices fabricated thereon into one of an oven or furnace. (Citing CX-158C at Q. 311.) {

}

Analog states that its process involves heating a compound having anti-stiction properties to a temperature sufficient to vaporize the compound. (Citing CX-158C at Q. 312.) {

}

Analog asserts that its process involves depositing the vapor on a surface of the wafer so that the wafer is coated with the compound to a thickness between 5 and 25 Angstroms. (Citing CX-158C at Q. 313.) { }

{ }

Analog claims that its process involves removing the treated wafer from the furnace. (Citing CX-158C at Q. 314; CX-156C at Q. 91; CX-82C at ANALOG29127.) Analog states that its process involves sawing the treated wafers to form a plurality of microelectromechanical devices having a device surface treated with an anti-stiction compound. (Citing CX-158C at Q. 315.) {

}

In its reply brief, Analog argues that Respondents did not set forth detailed contentions with respect to the domestic industry requirement in its pre-trial brief. (Citing RPHB at 86.) Analog claims that Respondents abandoned their new arguments that Analog does not satisfy the domestic industry requirement because they were not discussed with any particularity in Respondents' pre-trial brief. (Citing RIB at 45-48; Ground Rule 8.2.)

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}

Respondents' Position: Respondents contend that Analog has failed to satisfy the technical prong for the '614 patent.

Respondents argue that claim 12 of the '614 patent is invalid. According to Respondents, practicing an invalid claim cannot serve as the basis for a finding that Analog meets the domestic industry requirement.

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}

Staff's Position: Staff contends that the evidence establishes that Analog's process for manufacturing MEMS devices practices claim 12 of the '614 patent. Staff believes that the testimony of Analog's corporate witness Mr. O'Mara establishes that Analog's process meets each of the limitations of claim 12. (Citing CX-156C.)

In its reply, Staff argues that Respondents have waived their argument regarding the sawing step by not disclosing it in their pre-trial brief. (Citing Ground Rule 8.2.) {

}

Discussion and Conclusion: Based on the evidence in the record, I find that Analog has

satisfied the technical prong of the domestic industry requirement for the '614 patent.

Respondents offer two arguments in opposition to Analog's assertion that its anti-stiction process practices claim 12. First, Respondents argue that claim 12 is invalid. As discussed in Section IV.B *supra*, I have found that Respondents have failed to offer clear and convincing evidence that claim 12 is invalid.

Respondents next argue that in order to satisfy the domestic industry requirement based on a process claim, all steps of the process must take place in the United States. {

}

Analog and Staff both argue that Respondents waived this argument, and I concur. Ground Rule 8.2 requires that "[t]he pre-trial brief shall set forth **with particularity** a party's contentions on each of the proposed issues…" The rule warns that "[a]ny contentions not set forth in detail as required herein shall be deemed abandoned or withdrawn[.]"

{

} Respondents cite to a portion of the brief where they discuss the legal standard for domestic industry. (RPHB at 21-22.) There is nothing in the referenced portion of Knowles' brief that treats Respondents' argument with any particularity.

{

} Therefore, I find that pursuant to Ground Rule 8.2, Respondents waived this argument.

Assuming *arguendo* that Respondents did not waive their argument, I find that it lacks merit. { }

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}

Respondents rely on case law interpreting 35 U.S.C. § 271(a), and not Section 337. *See NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1313-1321 (Fed. Cir. 2005). I find that the law applied in that case is inapplicable to the issue at bar.

There is prior Commission case law that addresses this issue in the context of Section 337. Specifically, "[i]t has long been the Commission's view of the economic prong[32] of the domestic industry requirement in patent-based Section 337 investigations that in instances where the alleged domestic article has been partially produced abroad and partially produced in the

[31] Analog also attempts to rely on Mr. O'Mara's deposition testimony, which is cited as CX-23C. (CRB at 35.) CX-23C is not Mr. O'Mara's deposition testimony; it is Dr. Loeppert's deposition testimony. Mr. O'Mara's deposition testimony is listed as CX-19C, which was withdrawn.

[32] The cited opinion treats the issue of the location of the alleged domestic industry activities as part of the economic prong than the technical prong; but its analysis is equally applicable here, where the parties raise this issue in relation to the technical prong.

United States, an assessment must be made of the relative importance of domestic activities to the total activities conducted in connection with the product." *Certain Microlithographic Machines & Components Thereof*, Inv. No. 337-TA-468, Initial Determination (Jan. 29, 2003) (unreviewed). Furthermore, "in process patent cases where the complainant has performed the patented process entirely abroad but has incorporated the resulting product into the final product in the United States, the Commission has allowed these activities to be deemed a domestic industry under all three criteria of the economic prong without requiring any comparitve analysis of the complainant's domestic and foreign activities." *Id.* (citing *Certain Diltiazem Hydrochloride & Diltiazem Preparations*, Inv. No. 337-TA-349, Initial Determination (Feb. 1, 1995) (unreviewed in relevant part).)

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}

Analog's evidence regarding the limitations of claim 12 is unrebutted. Analog's process comprises a method for producing microelectromechanical devices. (CX-156C at Q. 29-32.) Analog's process includes the following steps required by claim 12:

- inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into one of an oven or a furnace (CX-158C at Q. 311; CX-

156C at 60-65; CX-82C);

- heating a compound having anti-stiction properties to a temperature sufficient to vaporize said compound (CX-158C at Q. 312; CX-156C at 80-82, 87; CX-82C);

- depositing said vapor on a surface of said wafer so as to treat said surface with said compound and to coat said surface with said compound to a thickness between 5 and 25 Angstroms (CX-158C at Q. 313; CX-156C at 88; CX-82C);

- removing said treated wafer from said oven or furnace (CX-158C at Q. 314; CX-156C at 91; CX-82C); and

- sawing said wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, and wherein said depositing step is carried out before said sawing step. (CX-158C at Q. 315; CX-156C at 92-96.)

Based on the foregoing, I find that Analog has proven by a preponderance of the evidence that its anti-stiction treatment process practices claim 12 of the '614 patent.

2. The '942 Patent

Analog's Position: Analog contends that its MEMS manufacturing process practices claim 1 of the '942 patent.

Analog states that its process comprises a method for producing microelectromechanical devices. (Citing CX-158C at Q. 322-323; CX-156C at Q. 22-23, 29-32.) Analog asserts that the process includes the step of inserting a wafer having a plurality of microelectromechanical devices fabricated thereon into an oven or furnace. (Citing CX-158C at Q. 322-323.) {

}

Analog claims that its process includes the step of heating a compound having anti-stiction properties within the oven or furnace to a temperature sufficient to vaporize the compound. (Citing (CX-158C at Q. 322-323.) { }

{

}

Analog asserts that its process includes the step of depositing the vapor on to the wafer surface so as to treat the surface with the anti-stiction compound. (Citing CX-158C at Q. 322-323.) {

}

Analog claims that its process includes the step of removing the wafer from the oven or furnace. (Citing CX-158C at Q. 314.) {

}

Analog states that its process includes the step of sawing the wafer to form a plurality of microelectromechanical devices having a device surface treated with the anti-stiction compound. (Citing CX-158C at Q. 322-323.) Analog asserts that the sawing step takes place after the wafer is treated with the anti-stiction compound. (Citing CX-158C at Q. 322-323; CX-156C at Q. 91-96.)

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}

Respondents' Position: Respondents contend that Analog failed to satisfy the technical

prong for the '942 patent for the same reasons as described with respect to '614 patent.

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}

In its reply brief, Respondents argue that Analog failed to offer sufficient evidence of the "sawing" limitation because Analog only offers evidence about "separating" the wafers. Thus, Respondents claim that Analog has waived the issue of domestic industry with respect to the '942 patent by failing to address the actual language of claim 1 of the '942 patent. (Citing Tr. at 856:2-4.)

Staff's Position: Staff contends that Analog satisfies the technical prong for the '942 patent for the same reasons as described with respect to the '614 patent.

Discussion and Conclusion: Based on the evidence in the record, I find that Analog has satisfied the technical prong of the domestic industry requirement for the '942 patent.

{

} I find that pursuant to Ground Rule 8.2, Respondents waived that argument. Respondents offer no argument regarding domestic industry for the '942 patent in their pre-trial brief. (*See* RPHB at 87-106.)

Assuming *arguendo* that Respondents' argument regarding the sawing limitation has not been waived, I find that it fails for the same reasons as described in Section VI.C.1 *supra*, which is hereby incorporated by reference.

Respondents also argue in their reply brief that Analog's evidence is insufficient because Analog's evidence addresses "separating" the wafers instead of "sawing" the wafers, as required by claim 1. I find that this argument has been waived because of Respondents' failure to include it in their pre-trial brief and initial post-trial brief. (*See* Ground Rules 8.2, 11.1.)

Assuming *arguendo* that Respondents' argument was timely, I find that it is without merit, as Analog has offered sufficient evidence concerning the "sawing" limitation. {

}

Analog's evidence regarding the limitations of claim 1 is unrebutted. Analog's process comprises a method for producing microelectromechanical devices. (CX-156C at Q. 29-32.) Analog's process includes the following steps required by claim 1:

- inserting a wafer having a plurality of microelectromechanical devices fabricated on a surface thereof into one of an oven or a furnace (CX-158C at Q. 311, 322-323; CX-156C at 60-65; CX-82C);
- heating a compound having anti-stiction properties within said oven or furnace to a temperature sufficient to vaporize said compound (CX-158C at Q. 312, 322-323; CX-156C at 80-82, 87; CX-82C);
- depositing said vapor on said wafer surface so as to treat the surface of said wafer with said compound (CX-158C at Q. 313, 322-323; CX-156C at 88; CX-82C);
- removing said wafer from said oven or furnace (CX-158C at Q. 314, 322-323; CX-156C at 91; CX-82C);
- sawing said treated wafer to form a plurality of microelectromechanical devices having a device surface treated with said anti-stiction compound, wherein said depositing step is carried out before said sawing step. (CX-158C at Q. 315, 322-323; CX-156C at 92-96.)

Based on the foregoing, I find that Analog has proven by a preponderance of the evidence that its anti-stiction treatment process practices claim 1 of the '942 patent.

VII. REMEDY & BONDING

A. Limited Exclusion Order

Analog's Position: Analog contends that the Commission should issue a limited exclusion order directed at the accused products of Respondents' and Respondents' products

containing the accused products.

In its reply brief, Analog notes that Respondents argue that any exclusion order should make clear that it does not cover Knowles' non-accused anti-stiction processes, which Respondents claim are non-infringing. Analog asserts that this would not be proper, as the three non-accused processes are generally subject to any remedial order that may issue. Analog argues that the three non-accused processes are within the scope of the investigation, which is defined by the Notice of Investigation. Analog claims that the affirmative statement sought by Respondents would be tantamount to an advisory opinion that the three non-accused processes are non-infringing.

Respondents' Position: Respondents contend that if a violation of Section 337 is found, the only appropriate remedy is an limited exclusion order directed to Knowles' products that are found to infringe any asserted claims. Respondents assert that it should be made clear that any exclusion order does not cover Knowles' non-accused anti-stiction processes.

Respondents explain that there are four anti-stiction processes that have been or are being used by Knowles for its SiSonic products. Respondents assert that Analog's infringement allegations focus on the SAM coating of un-singulated wafers. Respondents state that the following processes have not been accused of infringement: (1) a wet-SAM process; (2) a vapor process depositing anti-stiction coating on die level parts; and (3) a vapor process depositing anti-stiction coating on packaged parts. (Citing RX-210C at Q. 32-39, 42-51, 56-57, 64-68, 80.) Respondents argue because these processes are not part of the investigation, any SiSonic products made from the non-accused processes cannot be covered by a Commission remedial order. (Citing Order No. 8.)

Respondents assert that the exclusion order should include a certification provision. The

certification provision would allow Customs to accept a certification that Knowles' imported products are not being made using Knowles' accused wafer-level anti-stiction process and therefore are not excluded from entry under the order. According to Respondents, a certification provision is the only way that an exclusion order will not improperly disrupt the importation of SiSonic products that are not made by the accused process.

Staff's Position: Analog contends that a limited exclusion order should be entered against the accused MEMS devices. Analog states that according to Order No. 8, devices made by certain non-accused Knowles anti-stiction processes would not be subject to the limited exclusion order.

Because Knowles uses non-accused anti-stiction processes as well as the accused anti-stiction process, Staff recommends that it is appropriate to include a certification provision in the exclusion order. Staff states that certification provisions allow respondents to import non-infringing goods by providing Customs with a written certification that the imported products are outside the scope of the exclusion order.

Discussion and Conclusion: Should the Commission find a violation of Section 337, I recommend that the Commission issue a limited exclusion order that applies to Knowles and Mouser, as well as all of their affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, and covers the MEMS devices and products containing the same found to infringe the asserted patents.

Knowles performs other anti-stiction processes besides the process that Analog has accused of infringement. These anti-stiction processes have been described as: (1) a wet-SAM process; (2) a vapor process depositing anti-stiction coating on individual die; and (3) a vapor process depositing anti-stiction coating on packaged parts. These three anti-stiction processes

are not accused of infringement, and thus are not part of this investigation. (*See* Order No. 8.) Therefore, any exclusion order should not apply to the Knowles products made using one of the non-accused anti-stiction processes.

In light of the fact that there are Knowles SiSonic products made using the non-accused anti-stiction processes, I recommend that any exclusion order include a certification provision. The Commission has explained that "[c]ertification provisions are generally included in exclusion orders where Customs is unable to easily determine by inspection whether an imported product violates a particular exclusion order." *Certain Semiconductor Chips With Minimized Chip Package Size & Products Containing Same*, Inv. No. 337-TA-605, Commission Opinion (July 29, 2009) (including a certification provision in an exclusion order because of the difficulty of determining whether imported products contain the infringing chipsets); *see also Certain Ground Fault Circuit Interrupters & Products Containing Same*, Inv. No. 337-TA-615, Commission Opinion (Mar. 26, 2009) (noting that a certification provision "gives U.S. Customs & Border Protection the authority to accept a certification from the parties that goods being imported are not covered by the exclusion order.")

Without a certification provision, Customs will not be able to differentiate between the SiSonic products made using the accused anti-stiction process and the SiSonic products made using one of the non-accused anti-stiction processes. Therefore, I recommend that any exclusion order include a certification provision so that Customs does not block the importation of SiSonic products that are not manufactured using the accused process.

B. Cease & Desist Order

Analog's Position: Analog contends that the Commission should enter a cease and desist order against Respondent Mouser. According to Analog, Mouser has stipulated that it

maintains an inventory of imported SiSonic MEMS devices at its facility in Mansfield, Texas. (Citing JX-49C at ¶ 23.)

Respondents' Position: Respondents contend that Analog has failed to prove that a cease and desist order is warranted. Respondents state that Analog has put forth no evidence regarding Knowles' inventory of accused products. Knowles states that 100% of its current inventory is comprised of SiSonic products made by the non-accused die-level dry-SAM anti-stiction process. (Citing Tr. at 428:4-25.) Respondents claim that by the investigation target date, all of Mouser's inventory also likely will consist of SiSonic products made by the non-accused anti-stiction processes.

In their reply brief, Respondents argue that while Analog relies on the stipulated facts surrounding Mouser's inventory, Analog has failed to demonstrate that such inventory is "commercially significant." (Citing JX-49C at ¶ 23.)

Staff's Position: Staff contends that a cease and desist order should be entered against Mouser. Staff argues that evidence demonstrates that Mouser has a commercially significant inventory of accused MEMS devices in the United States. (Citing JX-49C at ¶ 23.)

Staff states that the evidence does not show that Knowles has a commercially significant inventory of accused MEMS devices in the United States. (Citing Tr. at 428:6-25.) Thus, Staff does not believe that a cease and desist order is appropriate for Knowles.

Discussion and Conclusion: Should the Commission find a violation of Section 337, I do not recommend the issuance of a cease and desist order.

Section 337 provides that in addition to, or in lieu of, the issuance of an exclusion order, the Commission may issue a cease and desist order as a remedy for violation of section 337. *See* 19 U.S.C. § 1337(f)(1). The Commission generally issues a cease and desist order directed to a

domestic respondent when there is a "commercially significant" amount of infringing, imported product in the United States that could be sold so as to undercut the remedy provided by an exclusion order. *See Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, USITC Pub. 2391, Comm'n Op. on Remedy, the Public Interest and Bonding at 37-42 (June 1991); *Certain Condensers, Parts Thereof and Products Containing Same, Including Air Conditioners for Automobiles*, Inv. No. 337-TA-334, Comm'n Op. at 26-28 (Aug. 27, 1997). The complainant bears the burden of proving that a respondent has a commercially significant inventory in the United States. *Certain Integrated Repeaters, Switches, Transceivers & Products Containing Same*, Inv. No. 337-TA-435, Comm'n Op., 2002 WL 31359028 (Aug. 16, 2002).

Analog seeks a cease and desist order against Mouser, and not Knowles. Analog bases its request on the following uncontested stipulated fact: "Mouser maintains an inventory of SiSonic MEMS products at its facility in Mansfield, Texas, the quantity varying from day-to-day but sometimes as high as 11,000." (JX-49C at ¶ 23.)

I find that this evidence is insufficient to demonstrate that Mouser is in possession of a "commercially significant" amount of accused products. As explained in Section VII.A *supra*, not every SiSonic product is made using the accused anti-stiction process. There is no evidence of the percentage of Mouser's inventory that consists of SiSonic products made using the accused process. This lack of detail prevents a finding that Mouser's inventory of SiSonic products ***made using the accused process*** is "commercially significant."

C. Bonding

Analog's Position: Analog contends that if the Commission finds a violation of Section 337, it must impose a bond. Analog seeks a bond of 100% of the entered value of the accused products.

{

} Analog claims that a reliable price comparison cannot be made because the unit prices for Knowles' products that incorporate the patented anti-stiction process differ greatly depending on the product. (Citing JX-49C at ¶¶ 19-20.) Analog argues that a bond of 100% is appropriate because there is no practical means of calculating a reasonable bond for Respondents' accused products.

Respondents' Position: Respondents contend that Analog has not demonstrated that it is entitled to a bond during the Presidential review period. Respondents state that should a bond be recommended, the bond rate should be set based on prices charged by Analog and Knowles for comparable products, specifically MEMS microphones.

In their reply brief, Respondents assert that a price comparison between Analog's and Knowles' products is possible, as Analog and Knowles have competed head-to-head in the market. (Citing RX-427C at 223:19-228:10, 231:19-232:10, 228:24-229:4.) {

} Respondents claim that Knowles' SiSonic microphones range from { .} (Citing JX-49C.) According to Respondents, the Commission could easily compare the two suppliers' low-end price within the respective ranges to derive the appropriate bond { }

Staff's Position: Staff contends that a bond of 100% is appropriate. Staff asserts that the unit prices for the accused products sold by Knowles and Mouser vary considerably. (Citing JX-49C at ¶¶ 19-20.) {

} Staff argues that the variation in price makes it difficult to arrive at a meaningful price differentiation at which to set the bond.

Discussion and Conclusion: Should the Commission find a violation of Section 337, I recommend no bond.

The administrative law judge and the Commission must determine the amount of bond to be required of a respondent, pursuant to section 337(j)(3), during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to order a remedy. The purpose of the bond is to protect the complainant from any injury. 19 CFR §§ 210.42(a)(1)(ii), 210.50(a)(3). The complainant has the burden of supporting any bond amount it proposes. *Certain Rubber Antidegradants, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-533, Comm'n Op., 2006 ITC LEXIS 591 (Jul. 21, 2006).

When reliable price information is available, the Commission has often set the bond by eliminating the differential between the domestic product and the imported, infringing product. *See Certain Microsphere Adhesives, Processes for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. a 24 (1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *See, e.g., Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41 (1995).

The Commission has set a bond of 100% when the evidence supported a finding that it would be difficult or impossible to calculate a bond based on price differentials. *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Comm'n Op., 1996 WL 1056209 (Sept. 23, 1996) (finding that a bond of 100% was appropriate "because of the difficulty in quantifying the cost advantages of respondents' imported Enercon E-40 wind turbines and because of price fluctuations due to exchange rates and market conditions.");

Certain Systems For Detecting and Removing Viruses or Worms, Components Thereof, and Products Containing Same, Inv. No. 337-TA-510, Comm'n Op., 2007 WL 4473083 (Aug. 2007) (imposing a bond of 100% based on a finding that the parties had numerous models and products lines, and that a price comparison would be difficult because respondent's products were a combination of hardware and software while the complainant's products were software only); *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n Op. at 26-27 (July 1997) (a 100% bond imposed when price comparison was not practical because the parties sold products at different levels of commerce, and the proposed royalty rate appeared to be *de minimis* and without adequate support in the record).

In *Certain Rubber Antidegradants*, the Commission did not require a bond. The presiding administrative law judge had set no bond, finding, "no evidence in the record to support any bond to offset any competitive advantage resulting from the unfair acts of [respondents] from their importations." *Certain Rubber Antidegradants*, 2006 ITC LEXIS 591, at *59.

The respondent argued that the lack of pricing information was due to the complainant's failure to adduce such evidence during the hearing and complainant should not be able to benefit from that failure. (*Id.* at 60.) In response, the complainant argued that it had no burden of proof with respect to bonding, and that the existence of a violation is sufficient to support a 100% bond. (*Id.*) In deciding the issue, the Commission stated:

> We find the ALJ's recommendation appropriate in the circumstances here and have determined not to require that a bond be posted for temporary importation. In our view, the complainant has the burden of supporting any proposition it advances, including the amount of the bond. [The complainant] did not meet that burden.

(*Id.*)

{

} There is evidence, however, from which to calculate a bond based on price differential. Knowles and Mouser both stipulated regarding the list price of the SiSonic products. (JX-49C at ¶¶ 19-22.) Knowles even broke down the prices of its products by model number, and provided current prices and a price range from 2003 to the present. (*Id.*) Analog, of course, knows the prices of its own products. Thus, I find that Analog had the information necessary to perform a price differential analysis. Because it failed to do so, I find that Analog has not met its burden to demonstrate the proper bond amount. Therefore, I recommend that if the Commission finds a violation of Section 337, no bond be required.

VIII. MATTERS NOT DISCUSSED

This Initial Determination's failure to discuss any matter raised by the parties, or any portion of the record, does not indicate that it has not been considered. Rather, any such matter(s) or portion(s) of the record has/have been determined to be irrelevant, immaterial or meritless. Arguments made on brief which were otherwise unsupported by record evidence or legal precedent have been accorded no weight.

IX. CONCLUSIONS OF LAW

1. The Commission has subject matter jurisdiction, *in rem* jurisdiction, and *in personam* jurisdiction.

2. There has been an importation into the United States, sale for importation, or sale within the United States after importation of the accused MEMS devices and products containing the same, which are the subject of the alleged unfair trade allegations.

3. An industry exists in the United States that exploits U.S. Pat. No. 7,220,614, as

required by 19 U.S.C. § 1337(a)(2).

4. Claims 12, 15, 31, 32, 34, 35, 38, and 39 of U.S. Pat. No. 7,220,614 are not invalid.

5. The accused Knowles process and products made using that process do not infringe claims 12, 15, 31, 32, 34, 35, 38, and 39 of U.S. Pat. No. 7,220,614.

6. There is no violation of 19 U.S.C. § 1337(a)(1) with respect to U.S. Pat. No. 7,220,614.

7. An industry exists in the United States that exploits U.S. Pat. No. 7,364,942, as required by 19 U.S.C. § 1337(a)(2).

8. Claims 1, 2, 3, 4, 5, 6, and 8 of U.S. Pat. No. 7,364,942 are not invalid.

9. The accused Knowles process does not infringe claim 1 of U.S. Pat. No. 7,364,942.

10. The accused Knowles process infringes claims 2, 3, 4, 5, 6 and 8 of U.S. Pat. No. 7,364,942.

11. There is a violation of 19 U.S.C. § 1337(a)(1) with respect to U.S. Pat. No. 7,364,942.

XI. ORDER

Based on the foregoing, and the record as a whole, it is my Final Initial Determination that there is a violation of 19 U.S.C. § 1337(a)(1) in the importation into the United States, sale for importation, and the sale within the United States after importation of certain MEMS devices and products containing the same.

I hereby **CERTIFY** to the Commission my Final Initial and Recommended Determinations together with the record consisting of the exhibits admitted into evidence. The pleadings of the parties filed with the Secretary, and the transcript of the pre-hearing conference and the hearing, as well as other exhibits, are not certified, since they are already in the Commission's possession in accordance with Commission rules.

It is further **ORDERED** that:

In accordance with Commission Rule 210.39, all material heretofore marked *in camera* because of business, financial and marketing data found by the administrative law judge to be cognizable as confidential business information under Commission Rule 201.6(a), is to be given *in camera* treatment continuing after the date this investigation is terminated.

The initial determination portion of the Final Initial and Recommended Determination, issued pursuant to Commission Rule 210.42(a)(1)(i), shall become the determination of the Commission sixty (60) days after the service thereof, unless the Commission, within that period, shall have ordered its review of certain issues therein, or by order, has changed the effective date of the initial determination portion. If the Commission determines that there is a violation of 19 U.S.C. § 1337(a)(1), the recommended determination portion, issued pursuant to Commission Rule 210.42(a)(1)(ii), will be considered by the Commission in reaching a determination on remedy and bonding pursuant to Commission Rule 210.50(a).

Within ten days of the date of this document, each party shall submit to the Office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. The parties' submissions must be made by hard copy by the aforementioned date and must include a copy of this document with red brackets indicating any portion asserted to contain confidential business information to be deleted from the public version. The parties' submission concerning the public version of this document need

not be filed with the Commission Secretary.

SO ORDERED.

Issued: 12/23/2010
DATE

Robert K. Rogers, Jr.
Administrative Law Judge

CERTAIN MEMS DEVICES AND PRODUCTS CONTAINING THE SAME

Inv. No. 337-TA-700

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **ORDER** was served upon **Kecia J. Reynolds, Esq.,** Commission Investigative Attorney, and the following parties via first class mail delivery on January 24, 2011

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street SW, Room 112A
Washington, D.C. 20436

FOR COMPLAINANT ANALOG DEVICES INC.:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG, LLP
1200 Seventeenth Street, NW
Fifth Floor
Washington, DC 20036

( ) Via Hand Delivery
(✓) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

FOR RESPONDENTS KNOWLES ELECTRONICS LLC and MOUSER ELECTRONICS, INC.:

Allan J. Sternstein
DYKEMA GOSSETT PLLC
Ten South Wacker Drive
Suite 2300
Chicago, IL 60606-7453

( ) Via Hand Delivery
(✓) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

PUBLIC CERTIFICATE OF SERVICE PAGE 2

PUBLIC MAILING LIST

Heather Hall
LEXIS – NEXIS
9443 Springboro Pike
Miamisburg, OH 45342

( ) Via Hand Delivery
(✓) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____

Kenneth Clair
THOMAS WEST
1100 Thirteenth Street NW, Suite 200
Washington, D.C. 20005

( ) Via Hand Delivery
(✓) Via Overnight Mail
( ) Via First Class Mail
( ) Other: _____