Nanosensors & EPA

Federal Remediation Technologies Roundtable Meeting

December 9, 2004

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Office of Research & Development
National Center for Environmental Research
Environmental Engineering Research Division

RESEARCH & DEVELOPMENT

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Nanotechnology - Potential Environmental Benefits

- Improved monitoring & detection capabilities
- **Ultra-Green** manufacturing and chemical processing - atom-by-atom construction
- Waste-minimization via designed-in pollution prevention at the source - less material to dispose of
- Reduced energy usage
- Commercially-viable alternative clean energy sources (fuel cells, solar)
- Inexpensive, rapid remediation and treatment technologies

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Nanotechnology - Possibility for Environmental Harm

Human health & Ecosystem Implications:

- Potential toxicity of novel materials
- Harm to the environment and/or ecosystem through manufacture, use, and/or disposal
- Unknown transport, transformation and fate information of nanomaterials
- Potential bioaccumulation and biotransformation issues

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Nanotechnology Research Sensors

STAR

2001 Environmental Applications of Nanotechnology

- 16 awards, $5.6 million, 4 sensor awards ~$1.5 million

2002 Environmental Applications/Implications of Nanotechnology

- 16 awards, $5 million, 7 sensor awards ~$2.4 million

2004 Research in Nanoscale Science, Engineering and Technology

- $2 million to under-funded institutions (closed Oct. 14)

SBIR

Annual Nanomaterials

- 24 Phase II sensor awards, $5.5 million. 1 sensor ~225 K

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2004 STAR Solicitation

Greater Research Opportunities: Research in Nanoscale Science, Engineering and Technology

- Environmentally Benign Manufacturing & Processing
- Remediation/Treatment
- Sensors

61 Proposals received (20 sensors)

Peer Review end of January 2005

Relevancy Review February/March 2005

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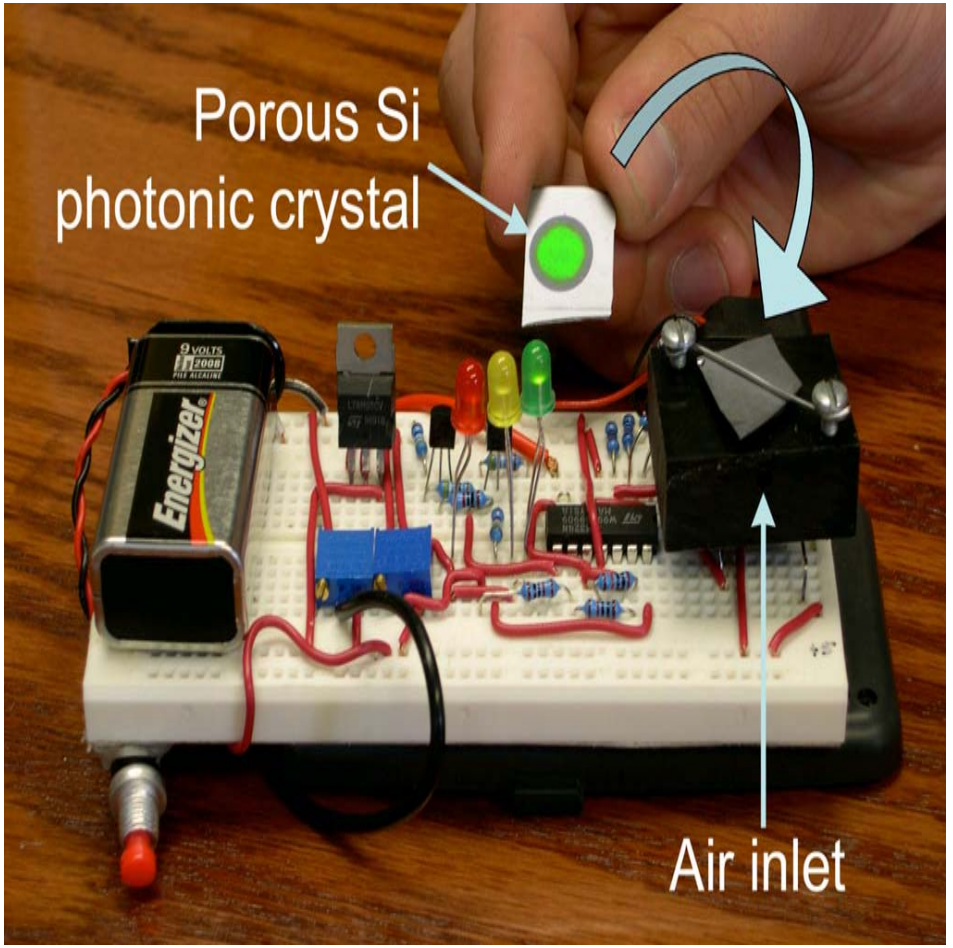
2002 STAR Grantee – #R829619

Mike Sailor/William Trogler, UC San Diego

January 2002 – December 2004



VOC sensor includes an optical mount to hold the chip, and the circuit board that amplifies the reflected light signal from a phototransistor.

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2004 SBIR Regular Solicitation

Phase I

Nanomaterials (1 of 9)

- Nanomaterial sensors for rapid and precise process control and environmental monitoring. EPA is particularly interested in remote, in situ, real-time and continuous measurement of species at trace (ppt) concentrations. Sensors that utilize lab-on-a-chip technology also are of interest

48 Proposals received

12 Passed Peer Review

5 will be funded (2 sensors)

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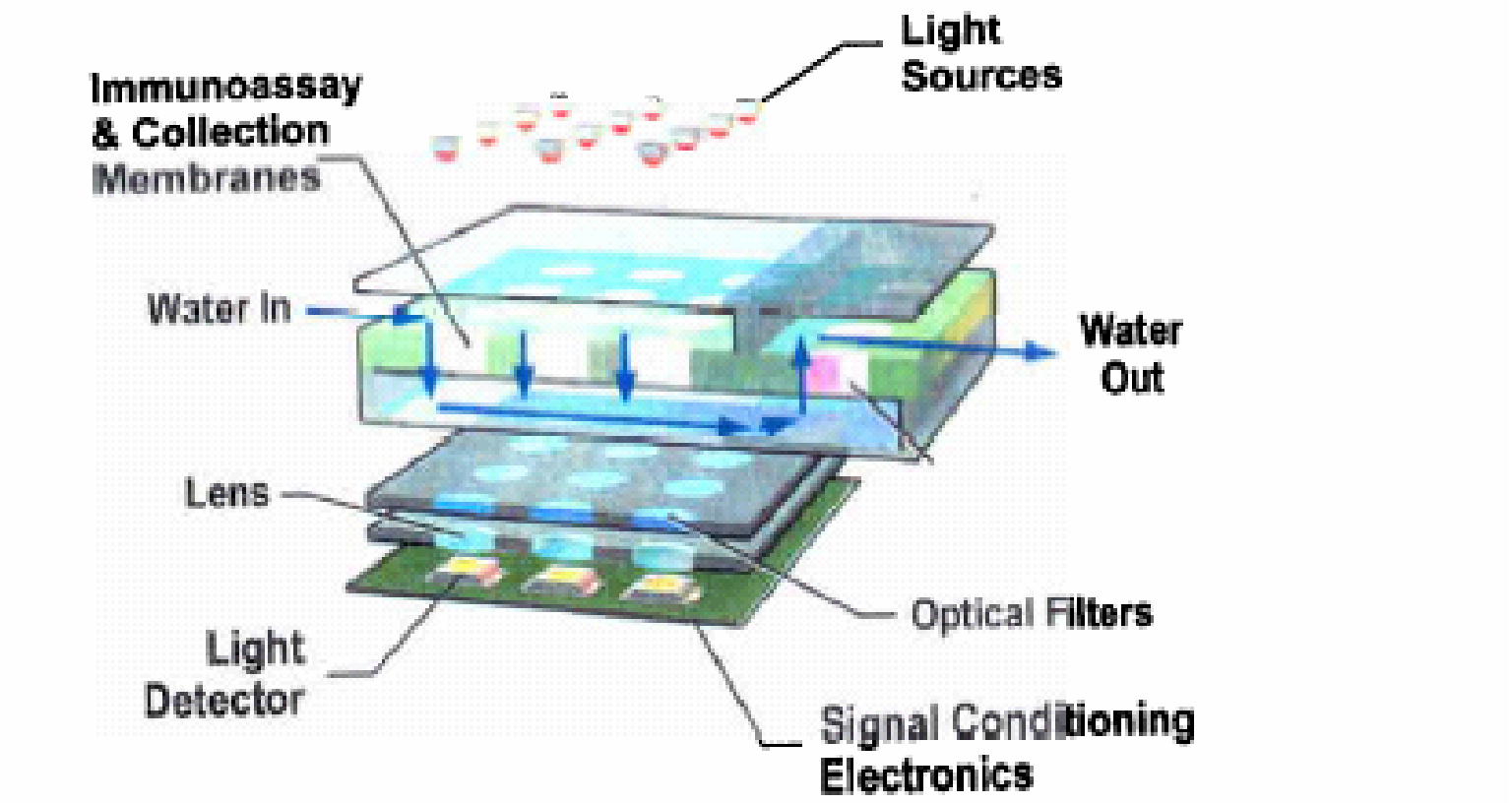
Phase II SBIR – #EPD04055

Intelligent Optical Systems, Inc.

Nanoparticle Enhanced Immunoassay for Monitoring Organic Pollutants

April 2004 – June 2005



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Nanotechnology Symposium
ACS 228th Annual Meeting
March 13 – 17, 2005 San Diego, CA

- **Toxicology and Biointeractions of Nanomaterials**
- **Nanocatalysis for Greener Technologies**
- **Environmentally Benign Nanocomposites**
- **Natural Biogeochemical Nanoprocesses**
- **Nanotech-Enabled Green Energy**
- **Nanotech-Enabled Sensors for Substances of Environmental Interest**
- **Treatment/Remediation using Nanotechnology**
- **Nomenclature, Measurement, and Standards for Nanosized Materials**
- **Fate/Transport of Nanostructured Materials**
- **Environmentally Benign Nanomanufacturing**

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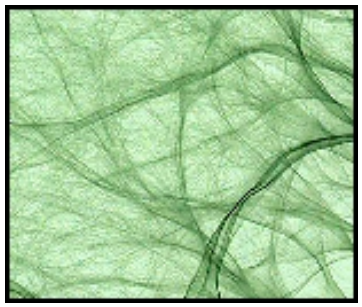
- **Nanotechnology**
- **Factsheet**
- **Solicitations**
- **Newsroom**
- **Research Projects**
- **Publications & Proceedings**

EPA's New Nano Web Page

Nanotechnology Home



Nanotechnology has both applications and implications for the environment. EPA is supporting research in this technology while evaluating its regulatory responsibility to protect the environment and human health. This site highlights EPA's research in nanotechnology and provides useful information on related research at EPA and in other organizations.

www.epa.gov/ncer/nano

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