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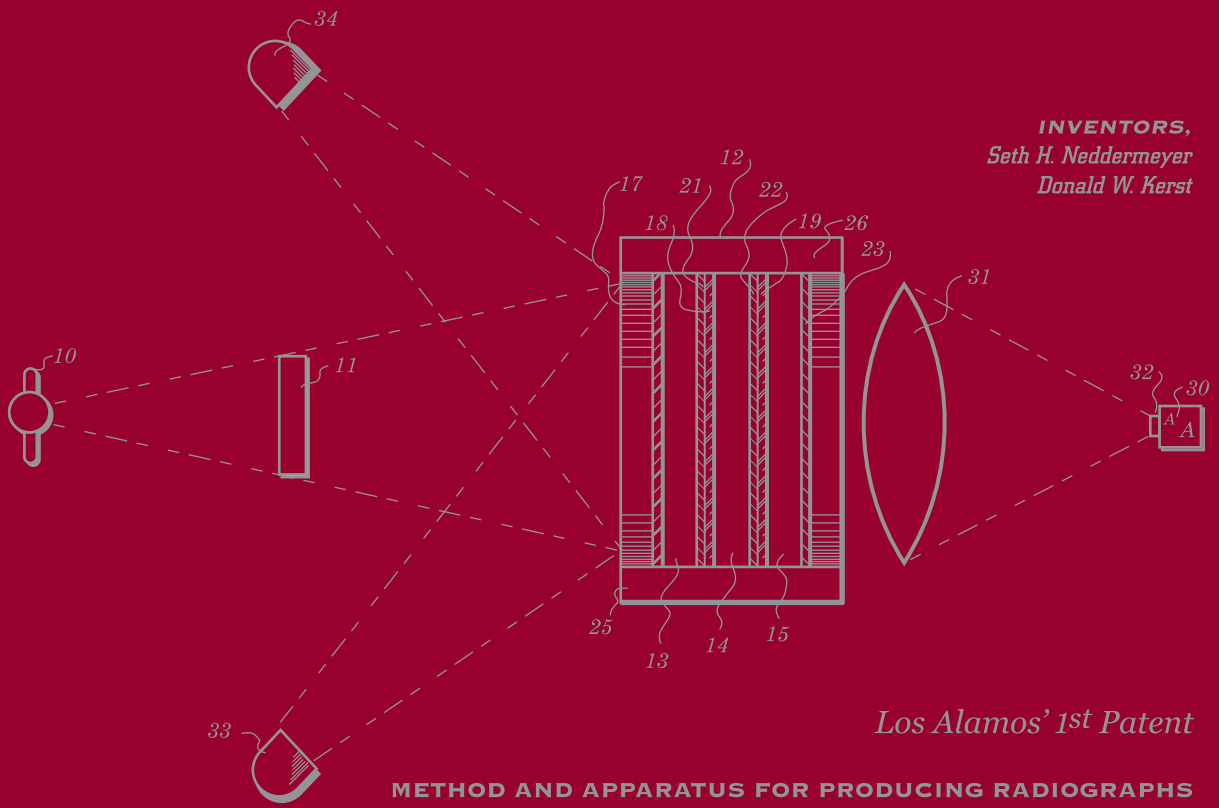


INVENTORS,
Seth H. Neddermeyer
Donald W. Kerst

Los Alamos' 1st Patent

METHOD AND APPARATUS FOR PRODUCING RADIOGRAPHS

Issued April 1947

THE 2004 PATENT & LICENSING AWARDS

Carrying on the tradition of world-changing innovation

outStanding innOvation

Applauding our innovators

The 2004 Patent & Licensing Awards

Carrying on the tradition of world-changing innovation

Monday, February 14, 2005
Los Alamos National Laboratory
Los Alamos, New Mexico

Los Alamos
NATIONAL LABORATORY
EST. 1943

Welcome to the seventh Annual Los Alamos National Laboratory Patent and Licensing Awards Reception! Once again we gather to honor our innovators for their contributions to the Laboratory's growing portfolio of copyrighted, patented and licensable technologies. These technologies represent the diversity and breadth of capabilities in scientific discovery and technological innovation resident within our laboratory. We applaud our innovators for their hard work, dedication and resolve in their contribution towards technology transfer activities at LANL by protecting the university's intellectual property and engaging in the commercialization process.

The past year has perhaps been one of our most challenging on record, however, despite these challenges our innovators continued to demonstrate that LANL's world-class scientific achievements can and do serve the nation by helping to strengthen economic security through enhancement of U.S. industrial competitiveness. The Laboratory's reputation for excellence—earned with over 60 years of scientific contributions to the nation—helps ensure trust in our ability to continue generating exceptional work to meet the challenges of a rapidly changing world. The efforts of our innovators to engage in technology transfer activities help the Laboratory attract new employees, program sponsors and collaborators. These activities contribute to the accomplishment of our Laboratory mission and support not only our reputation for scientific excellence but also our efforts to achieve excellence in business and operations.

I extend congratulations on behalf of my senior management team as well as the entire Laboratory community to this evening's honorees for their achievements and encourage continued participation in the technology transfer process by our honorees and their colleagues. It is this type of engagement with the external business community that will help Los Alamos National Laboratory flourish in the years ahead.

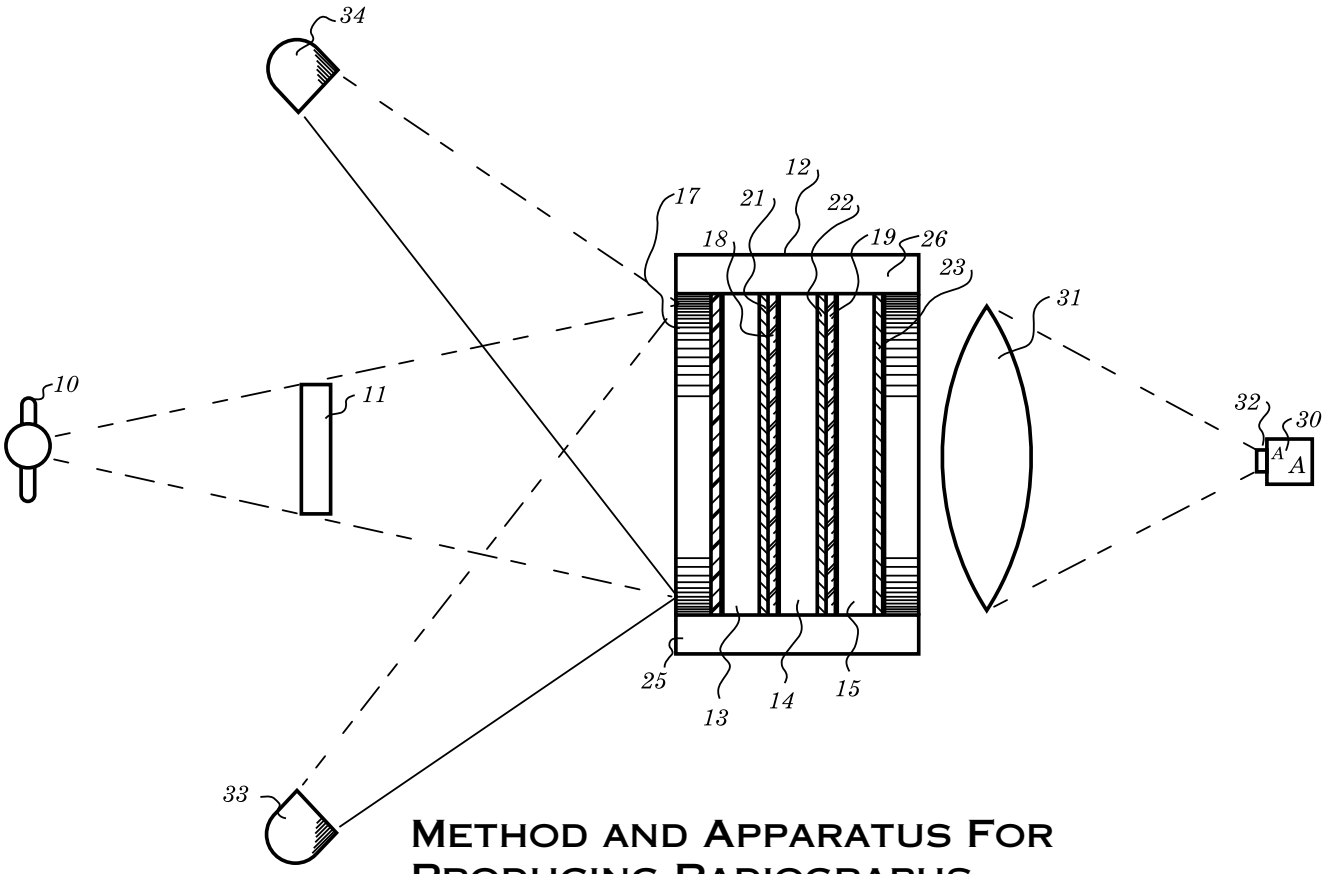
Congratulations and thank you for a job well done!

G. Peter Nanos, Jr.
Director

Keynote Speaker

Tim Studt is the Editor in Chief of *R&D Magazine*, a business-to-business publication of Reed Business Information, a division of Reed Elsevier, London. Tim has worked for *R&D* for more than 17 years and has been its Editor for nine years. Over the past nine years, *R&D* has won more than 30 national editorial excellence awards and spun off two successful stand-alone publications and four newsletters. Prior to *R&D*, Tim worked for Westinghouse Electric, the U.S. Navy, NASA, and Wilson Sporting Goods, all in research and development staff and management positions. Tim has a BS in Mechanical and Aerospace Engineering from Illinois Institute of Technology and an MBA from Lewis University.

Tim Studt's keynote speech for the Patent & Licensing Award Reception at Los Alamos National Laboratory on February 14, 2005, will focus on "Measuring Innovation." Global competition, an abundance of emerging technologies, and a thriving economy are supporting a new age of innovation. Tim will touch on the results of reader surveys and interviews with R&D leaders as to the real, practical measures of innovation.



Method and Apparatus For Producing Radiographs

The first patent obtained at Los Alamos National Laboratory was filed in 1945 in the names of Seth Neddermeyer and Donald Kerst, two original Los Alamos employees who were well-known for their creative and unrestrained experimentations into the explosive compression of materials. The patent covered an apparatus for conducting high-speed x-ray radiography of explosive detonations. No mention of Los Alamos appears in the published patent, as Los Alamos was a “secret city” when the patent issued in 1947. This invention was an early accomplishment of a research program that has continued for some 60 years and for which Los Alamos is internationally renowned. Today this program has culminated in the operation of the Dual Axis Radiographic Hydrodynamic Test facility (DARHT). Phase 1 of DARHT in now fully operational with a single-pulsed, first axis, x-ray machine. Phase 2 comprises an orthogonal second axis capable of delivering multiple x-ray pulses. Construction was completed in March 2003 and commissioning is in progress.

FY 2004 Issued Patent Recipients and License Income Recipients

Allander, Krag (N)
**Single and Double Grid Long-Range Alpha Detectors*
**Radon Detection*

Alvarez, Marc A. (B-3)
Synthesis of [$^{2}H_{1}$,^{13}C], [$^{2}H_{2}$,^{13}C] and [$^{2}H_{3}$,^{13}C]Methylaryl Sulfides
Synthesis of Labeled Oxalic Acid Derivatives
Synthesis of [$^{2}H_{1}$,^{13}C], [$^{2}H_{2}$,^{13}C] and [$^{2}H_{3}$,^{13}C] Methylaryl Sulfones and Sulfoxides
Synthesis of ^{2}H-and ^{13}C Substituted Compounds

Arendt, Paul N. (MST-STC)
**High Temperature Superconducting Thick Films*
High Temperature Superconducting Thick Films Composite Conductors
Surface Control of Alloy Substrates and Methods of Manufacture Therefor
Oriented Conductive Oxide Electrodes on Sio_{2}/Si and Glass
Buffer Layers on Metal Alloy Substrates for Superconducting Tapes

Asay Blaine (DX-2)
** Lead-Free Electric Match Compositions*

Atcher, Robert W. (B)
Synthesis of Labeled Metabolites

Audia, Jeffrey (N-1)
**MiniGrand Family*

Ayala, Alicia (MST-STC)
High Temperature Superconducting Thick Films Composite Conductors

Backhaus, Scott N. (MST-10)
**Traveling-Wave Device with Mass Flux Suppression*
Cascaded Thermoacoustic Devices
Circulating Heat Exchangers for Oscillating-Wave Engines and Refrigerators
Mechanism and Apparatus for Rapid Stopping and Starting of a Thermoacoustic Engine
Method and Apparatus for Separating Mixtures of Gases Using an Acoustic Wave

Baggerly, Keith (D-1)
**TRANSIMS Software*

Bai, Ying (N)
**MinGrand Family*

Baird, William (N-2)
Handheld CZT Radiation Detector

Barbe, Michael (MST-6)
**Laser Production of Articles from Powders*

Barrett, Christopher (CCS-DSS)
**TRANSIMS Software*

Beckman, Richard (CCS-DO)
**TRANSIMS Software*

Berkbigler, Kathryn (CCS-3)
**TRANSIMS Software*

Billen, James (LANSCE-1)
**Phase and Radial Motion in Electron Linear Accelerators (PARMELA)*

Birnbaum, Eva (C-INC)
Carbon Dioxide-Soluble Polymers and Swellable Polymers for Carbon Dioxide Applications

Bisset, Keith (CCS-DO)
**TRANSIMS Software*

Boenig, Heinrich (MST)
**Fault Current Limiter and Alternating Current Circuit Breaker*

** License Income Recipients*

Bounds, John (N-2)
**Radon Detection*
**Fan-Less Long Range Alpha Detector*

Bourret, Steven (MST-STC)
**Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting*
**MiniGrand Family*

Bowles, Jeffrey (N)
**MiniGrand Family*

Bradley, Jonathan (CCS)
**Storage and Retrieval of Large Digital Images*

Briles, Scott D. (ISR-3)
Remote Down-Hole Well Telemetry

Brosha, Eric L. (MST-11)
Method for Forming a Potential Hydrocarbon Sensor with Low Sensitivity to Methane and CO

Brown, Donald W. (EES-11)
Geothermal Energy Production with Supercritical Fluids

Brunson, Glenn (N-2)
**WIN-CTEN Software*

Burrell, Anthony (C-SIC)
**Electrolytes for Electrooptic Devices Comprising Ionic Liquids*
**Radiofrequency Attenuator and Method*
**Electrochromic Salts, Solutions and Devices*
**Reversible Electrooptic Device Employing Aprotic Molten Salts and Method*

Bush, Brian (D-4)
**TRANSIMS Software*

Busick, Deanna (MST)
**Composite Bipolar Plate for Electrochemical Cells*

Busse, James (C-ADI)
**Lead-Free Electric Match Compositions*

Butterfield, Kenneth (N-2)
Handheld CZT Radiation Detector

Buttler, William T. (P-23)
Method and Apparatus for Free-Space Quantum Key

Cai, Hong (B-2)
**DNA Base Mismatch Detection Using Flow Cytometry*

Cannon, T. Michael (CCS-3)
**Quality Assessment, Restoration, and oCr. (QUARC), version 1*

Canpolat, Murat (B-3)
Particle Size Analysis in a Turbid Media with a Single-Fiber, Optical Probe While Using a Visible Spectrometer Particle Size Analysis in a Turbid Media with a Single-Fiber, Optical Probe While Using a Visible Spectrometer

Castro, Alonso (P-21)
**Method for the Detection of Specific Nucleic Acid Sequences by Polymerase Nucleotide Incorporation*

Chavez, David E. (DX-2)
**High Nitrogen Energetic Material Based Pyrotechnic Compositions*
**Low-Smoke Pyrotechnic Compositions*
3,6-BIS(1H-1,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine or Salt Thereof

Chen, Liaohai (B)
**Method for Detecting Biological Agents*
Tuning the Properties of Conjugated Polyelectrolytes and Application in a Biosensor Platform
Volatile Chemical Reagent Detector

Chertkov, Michael (T-13)
Methods and Optical Fibers That Decrease Pulse Degradation Resulting from Random Chromatic Dispersion

Clark, Noline C. (C-SIC)
Catalysts for Lean Burn Engine Exhaust Abatement

Coates, Don (P-DO)
Remote Down-Hole Well Telemetry

Cole, Dean (B)
**Method of Using 5,10,15,20-Tetrakis(4-Carboxyphenyl) Porphine for Detecting Cancers of the Lung*
**Method Using 5,10,15,20-Tetrakis(4-Carboxyphenyl) Porphine for Treating Cancers of the Lung*

Collins, Michael (N-1)
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Cooke, D. Wayne (MST-8)
Crystalline Rare Earth Activated Lutetium Oxyorthosilicate Phosphors

Cournoyer, Michael (NMT-1)
**Chemical Software Input (CSWI)*

Cremers, David (C-ADI)
**Laser Production of Articles from Powders*

Cucchiara, Alfred (HSR-1)
**Long Range Alpha Particle Detector*

Danen, Wayne C. (DX-DO)
Energetic Powder
Method for Producing Chemical Energy

Davey, John R. (MST-11)
**Catalyst Inks and Method of Application for Direct Methanol Fuel Cells*

Davis, Anthony (ESA-AET)
**Flat Panel Amorphous Silicon High Resolution Computed Tomography-Data Acquisition Software*
**Flat Panel Amorphous Silicon High Resolution Digital Radiography*

Dixon, Raymond (MST-6)
**Production of Elongated Articles from Particulates*
**Controlled Laser Production of Elongated Articles from Particulates*

Du, Xian (B-4)
Photopolymerization-Based Fabrication of Chemical Sensing Films

Duan, Yixiang (C-ACS)
Pulsed, Atmospheric Pressure Plasma Source for Emission

Dunbar, John M. (B-1)
Sample Collection System for Gel Electrophoresis

Dye, Robert C. (DX-2)
Meniscus Membranes for Separation

Early, James W. (DX-1)
Laser Ignition

Ehler, Deborah (C-SIC)
**Water-Soluble Polymers for Recovery of Metals from Solids*

Estep, Robert (N-2)
**MiniGrand Family*

Eubank, Stephen (CCS-DO)
**TRANSIMS Software*

Findikoglu, Alp T. (MST-STC)
Dynamic Time Expansion and Compression Using Nonlinear Waveguides

Foltyn, Stephen R. (MST-STC)
**High Temperature Superconducting Thick Films*
High Temperature Superconducting Composite Conductors
Surface Control of Alloy Substrates and Methods of Manufacture Therefor
Buffer Layers on Metal Alloy Substrates For Superconducting Tapes

Fowler, Clarence (C-INC)
Production of High Specific Activity Copper-67

Frankle, Christen M. (P-22)
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Freund, Samuel M. (LC-IP)
Remote Down-Hole Well Telemetry

Gabitov, Ildar R. (T-7)
Methods and Optical Fibers that Decrease Pulse Degradation Resulting from Random Chromatic Dispersion

Garcia, Anthony (C-ADI)
Magnetic Vector Field Tag and Seal

Gardner, David L. (MST-10)
**Pulse Tube Refrigerator with Variable Phase Shift*
**Traveling-Wave Device with Mass Flux Suppression*
Cascaded Thermoacoustic Devices
Mechanism and Apparatus for Rapid Stopping and Starting of a Thermoacoustic Engine
Method and Apparatus for Rapid Stopping and Starting of a Thermoacoustic Engine

Garzon, Fernando H. (MST-11)
Method for Forming a Potential Hydrocarbon Sensor with Low Sensitivity to Methane and CO

Geller, Drew A. (ESA-TSE)
Method and Apparatus for Separating Mixtures of Gases Using an Acoustic Wave

Gleiman, Seth S. (ESA-MEE)
Spherical Boron Nitride Particles and Method for Preparing them

Gohdes, Joel (C)
**Water-Soluble Polymers and Compositions Thereof*

Gokhale, Maya (ISR-3)
**Streams-C C-to-VHDL Compiler (Streams-C)*

Gottesfeld, Shimson (MST-11)
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**Catalyst Inks and Method of Application for Direct Methanol Fuel Cells*
**Preventing CO Poisoning in Fuel Cells*
**Methanol Sensor Operated in Passive Mode*
**Methanol Sensor Operated in Driven Mode*
**Flow Channel Device for Electrochemical Cells*
Catalyst Inks and Method of Application for Direct Methanol Fuel Cells

Graves, Steven (B-2)
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Gritzo, Russell E. (C-INC)
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Groves, James R. (MST-STC)
High Temperature Superconducting Composite Conductors

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Habbersett, Robert (B-2)
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Hahn, Sangkoo F. (ISR-4)
Dynamic Time Expansion and Compression Using Nonlinear Waveguides

Halbig, James (N-1)
**MiniGrand Family*

Hale, Thomas C. (ISR-2)
Line Sensing Device for Ultrafast Laser Acoustic Inspection Using Adaptive Optics

Hall, Simon B. (C-SIC)
**Reversible Electrooptic Device Employing Aprotic Molten Salts and Method*
**Radiofrequency Attenuator and Method*

Hamada, Michael (D-1)
**Optimizing the Availability of a Buffered Industrial Process*

Hammel, P. Chris (MST-10)
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Hammond, Mark (B)
**DNA Fragment Sizing and Sorting by Laser-Induced Fluorescence*

Hansen, Walter (N-1)
**MiniGrand Family*

Harker, William (N-1)
**SuperHENC Neutron Coincidence Code (Super HENC)*
**MiniGrand Family*

He, Duanwei (C-INC)
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Heaton, Richard C. (C-INC)
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Heeger, Alan J. (STB-DSTB)
Nondegenerate Four-Wave Mixing Using Photoinduced Charge-Transfer Materials

Henins, Ivars (P-24)
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**Atmospheric Pressure Plasma Processing Reactor*
**Combined Plasma/Liquid Cleaning of Substrates*
**Large Area Atmospheric-Pressure Plasma Jet*

Hermann, Hans (P-24)
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**Processing Materials Inside an Atmospheric-Pressure Radio-frequency Nonthermal Plasma Discharge*
**Atmospheric Pressure Plasma Processing Reactor*

Hicks, Robert (P)
**Deposition of Coatings Using an Atmospheric Pressure Plasma Jet*
**Large Area Atmospheric-Pressure Plasma Jet*

Hill, Karen K. (B-1)
Sample Collection System for Gel Electrophoresis

Hiskey, Michael A. (DX-2)
**Lead-Free Electric Match Compositions*
**High Nitrogen Energetic Material Based Pyrotechnic Compositions*
**Low-Smoke Pyrotechnic Compositions*
**Preparation of BIS-(1(2)H-Tetrazol-5-Yl)-Amine Monohydrate*
3,6-Bis(1H-1,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine or Salt Thereof

Hogden, John E. (CCS-3)
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Holesinger, Terry G. (MST-STC)
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Horley, Earl (N-1)
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Howat, andrew (X)
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Hsu, Hsiao-Hua (P-24)
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Huang, Jianyu (MST-STC)
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Jacob, Rudiger (D-2)
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Jett, James (MST-STC)
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Jia, Quanxi (MST-STC)
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Jiang, Honggang (MST)
**Method for Producing Ultrafine-grained Materials Using Repetitive Corrugation and Straightening*

Jin, Zhe (C-ACS)
**Pulsed, Atmospheric Pressure Plasma Source for Emission Spectrometry*

Johnson, Jeffrey (CCN-7)
**SABRINA*

Johnston, Roger G. (C-ADI)
Magnetic Vector Field Tag and Seal

Jorgensen, Betty S. (DX-2)
Energetic Powder
Meniscus Membranes for Separation
Method for Producing Chemical Energy

Kaduchak, Gregory (MST-11)
Cylindrical Acoustic Levitator/ Concentrator Having Non-Circular Cross-Section

Kane, Daniel (C)
**Method and Apparatus for Measuring the Intensity and Phase of an Ultrashort Light Pulse*

Keller, Richard (B-2)
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Kelley, Thomas (N-1)
**PC/FRAM Software*

Kelly, Patrick (CCS-3)
**QUality Assessment, Restoration, and oCr. (QUARC), version 1*

Klosterbuer, Shirley (N-1)
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Konjevod, Goran (CCS-DSS)
**TRANSIMS Software*

Krick, Merlyn (N-1)
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Kubicek, Deborah (D-4)
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Kuske, Cheryl R. (B-1)
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Lackner, Klaus S. (T)
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Lamartine, Bruce (MST/TT)
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Less, Richard (MST-6)
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Lester, Charles S. (HR-S)
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Lewis, Gary (MST-6)
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Li, Lin Song (MST-STC)
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Lunsford, James (P-14)
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MacArthur, Duncan (N-1)
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Maniloff, Eric S. (C-PCS)
Nondegenerate Four-Wave Mixing Using Photoinduced Charge-Transfer Materials

Marathe, Madhav V. (CCS-DO)
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Marrone, Babetta (B-1)
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Martin, John (B)
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Martin, Richard (ESA-GTS)
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Martinez, Rodolfo A. (B-3)
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Synthesis of [$^{2}H_{1}$,^{13}C], [$^{2}H_{2}$,^{13}C] and [$^{2}H_{3}$,^{13C}]Methylaryl Sulfides
Synthesis of ^{2}H-and ^{13}C-Substituted Compounds
Synthesis of Labeled Oxalic Acid Derivatives
Synthesis of [$^{2}H_{1}$,^{13}C], [$^{2}H_{2}$,^{13}C] and [$^{2}H_{3}$,$a^{3}C$] Methylaryl Sulfones and Sulfoxides

Martz Jr., Harry (D-1)
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McAtee, James (HSR)
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Mattes, Benjamin R. (C-PCS)
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McBranch, Duncan (C-PCS)
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Nondegenerate Four-Wave Mixing Using Photoinduced Charge-Transfer Material
Volatile Chemical Reagent Detector

McClellan, Kenneth J. (MST-8)
Crystalline Rare Earth Activated Lutetium Oxyorthosilicate Phosphors

McCleskey, Thomas (C-SIC)
**Electrolytes for Electrooptic Devices Comprising Ionic Liquids*
**Radiofrequency Attenuator and Method*
**Electrochromic Salts, Solutions and Devices*
**Reversible Electrooptic Device Employing Aprotic Molten Salts and Method*
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Menlove, Howard (N-1)
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Meyne, Juliaane (B-4)
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Midzor, Melissa (MST-10)
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Migliori, Albert (MST-NHMFL)
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Milewski, John (MSM-5)
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Moody III, David (EES-2)
**Method of Using 5,10,15,20-Tetrakis(4-Carboxyphenyl) Porphine for Detecting Cancers of the Lung*
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Moore, David S. (DX-2)
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Morgan, George L. (P-23)
Method and Apparatus for Free-Space Quantum Key Distribution in Daylight

Mourant, Judith R. (B-3)
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Moyzis, Robert (B)
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Mukundan, Rangachary (MST-11)
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Murray, William S. (N-2)
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Nagel, Kai (D)
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Naud, Darren (DX-2)
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**Preparation of Bis-(1(2)H-Tetrazol-5-Yl)-Amine Monohydrate*
**Low-Smoke Pyrotechnic Composition*
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Neagley, Daniel L. (DX-2)
Remote Down-Hole Well Telemetry

Nemec, Ronald (MST-6)
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Neutzler, Jay (T)
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Nickel, George H. (P-22)
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Nix, David A. (CIC-3)
Speech Processing Using Conditional Observable Maximum Likelihood Continuity Mapping

Nolan, John (B-2)
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**Nucleic Acid Sequence Detection Using Multiplexed Oligonucleotide PCR*
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Nordholt, Jane E. (P-21)
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Olivares, José A. (C-DO)
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Olsher, Richard (HSR-4)
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**Neutron Dose Equivalent Meter*

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Ott, Martin, A. (C-INC)
Production of High Specific Activity Copper-67

Paffett, Mark T. (C-SIC)
Catalysts for Lean Burn Engine Exhaust Abatement

Park, Jaeyoung (P-24)
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Parker, Robert (N-1)
**MiniGrand Family*

Pautz, Shawn (CCS)
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Pelekhov, Denis V. (MST-10)
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Pelowitz, David (N-1)
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Perry, William L. (DX-2)
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Method for Producing Metallic Microparticles

Pesiri, David R. (MST-7)
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Peterson, Charles G. (P-21)
Spherical Boron Nitride Particles and Method for Preparing Them

Phillips, Jonathan (ESA-MEE)
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Spherical Boron Nitride Particles and Method for Preparing Them
Method for Producing Metallic Microparticles

Powell, Kimberly R. (C-SIC)
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Reass, Pamela (N-1)
**MiniGrand Family*

Reass, William A. (LANSCE-5)
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Ren, Xiaoming (MST-11)
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**Flow Channel Device for Electrochemical Cells*
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Williams, Michael (D-3)
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Method for Improving Fuel Cell Performance

Francisco A. Uribe (MST-11)
Thomas A. Zawodzinski Jr. (MST-11)
U.S. Patent No. 6,635,369

A fuel cell can be operated at high voltage for sustained periods of time by switching the cathode to an output load effective to reduce the cell voltage at a pulse width effective to reverse performance degradation from OH adsorption onto cathode catalyst surfaces.

Circulating Heat Exchangers for Oscillating-Wave Engines and Refrigerators

Gregory W. Swift (MST-10)
Scott N. Backhaus (MST-10)
U.S. Patent No. 6,637,211

An oscillating-wave engine or refrigerator having a regenerator or a stack in which oscillating flow of a working gas occurs in a direction defined by an axis of a trunk of the engine or refrigerator incorporates an improved heat exchanger. A circulating heat exchanger loop is connected to the trunk whereby at least one fluidic diode within the circulating heat exchanger loop produces a superimposed steady flow component and oscillating flow component of the working gas within the circulating heat exchanger loop. A local process fluid is in thermal contact with an outside portion of the circulating heat exchanger loop.

Production of High Specific Activity Copper-67

David J. Jamriska Sr. (C-INC)
Wayne A. Taylor (NMT-11)
Martin A. Ott (C-INC)
Clarence Fowler (DX-2)
Richard C. Heaton (C-INC)
U.S. Patent No. 6,638,490

High specific activity Cu^{67} is produced and isolated from a proton-irradiated enriched Zn^{70} target using electrochemical methods or ion exchange for separation of the Cu^{67} product from the target material and radioactive impurities of gallium, cobalt, iron, and stable aluminum, using both anion and cation organic ion exchangers, for chemical recovery of the enriched Zn^{70} target material.

Line Sensing Device for Ultrafast Laser Acoustic Inspection Using Adaptive Optics

Thomas C. Hale (NIS-2)
David S. Moore (DX-2)
U.S. Patent No. 6,643,005

Apparatus and method for inspecting thin film specimens along a line. A laser emits pulses of light that are split into four portions. A delay is introduced into the first portion of pulses, which are directed onto a thin film specimen along a line. The third portion of pulses is directed onto the thin film specimen along the line. A delay is introduced into the fourth portion of pulses, which are directed to a photorefractive crystal. Pulses of light reflected

from the thin film specimen are directed to the photorefractive crystal. Light from the photorefractive crystal is collected and transmitted to a linear photodiode array allowing inspection of the thin film specimens along a line.

Method and Apparatus for Rapid Stopping and Starting of a Thermoacoustic Engine

Gregory W. Swift (MST-10)
Scott N. Backhaus (MST-10)
David L. Gardner (MST-10)
U.S. Patent No. 6,644,028

A thermoacoustic engine-driven system with a hot heat exchanger, a regenerator or stack, and an ambient heat exchanger includes a side branch load for rapid stopping and starting, the side branch load being attached to a location in the thermoacoustic system that has a nonzero oscillating pressure and a valve, a flow resistor, and a tank connected in series. The system is rapidly stopped simply by opening the valve and rapidly started by closing the valve.

Cylindrical Acoustic Levitator/ Concentrator Having Non-Circular Cross-Section

Gregory Kaduchak (MST-11)
Dipen N. Sinha (MST-11)
U.S. Patent No. 6,644,118

A low-power, inexpensive acoustic apparatus for levitation and/or concentration of aerosols and small liquid/solid samples having particulates up to several millimeters in diameter in air or other fluids. It is constructed from a commercially available, hollow piezoelectric crystal that has been formed with a cylindrical cross-section to tune the resonance frequency of the breathing mode resonance of the crystal to that of the interior cavity of the cylinder. When the resonance frequency of the interior cylindrical cavity is matched to the breathing mode resonance of the cylindrical piezoelectric transducer, the acoustic efficiency for establishing a standing wave pattern in the cavity is high. By deforming the circular cross-section of the transducer, the acoustic force is concentrated along axial regions parallel to the axis of the transducer. The concentrated regions of acoustic force cause particles in the fluid to concentrate within the regions of acoustic force for separation from the fluid.

Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry

Dipen N. Sinha (MST-11)
U.S. Patent No. 6,644,119

The flow and/or the composition of a flowing liquid is noninvasively monitored using ultrasound. The position of the resonance peaks for a fluid excited by a swept-frequency ultrasonic signal has been found to change frequency both in response to a change in composition and in response to a change in the flow velocity thereof. Additionally, the distance between successive resonance peaks does not change as a function of flow but rather in response to a change in composition. Thus, a measurement of both parameters (resonance position and resonance spacing), once calibrated, permits the simultaneous determination of flow rate and composition.

Ion Monitoring

Christopher H. Orr
Craig J. Luff
Thomas Dockray
Duncan MacArthur (N-1)
U.S. Patent No. 6,649,916

Capacitance effects in detector electrodes arising due to movement of the instrument relative to the item/location being monitored in ion detection based techniques are significantly reduced. The capacitance variations are rendered less significant by placing an electrically conducting element between the detector electrodes and the monitored location/item. Improved sensitivity and reduced noise signals arise as a result. Elongated items that are unsuited to complete enclosure in one go within a chamber and are monitored part by part as they pass through the instrument, increasing the range of items or locations that can be successfully monitored.

Spherical Boron Nitride Particles and Method for Preparing Them

Jonathan Phillips (ESA-MEE)
Seth S. Gleiman (ESA-MEE)
Chun Ku Chen
U.S. Patent No. 6,652,822

Spherical and polyhedral particles of boron nitride are produced from precursor particles of hexagonal phase boron nitride suspended in an aerosol gas. The aerosol is directed to a microwave plasma torch that generates plasma including nitrogen atoms at atmospheric pressure. The presence of nitrogen atoms is critical in allowing boron nitride to melt at atmospheric pressure while avoiding or at least minimizing decomposition. The plasma includes a plasma hot zone, which is a portion of the plasma that has a temperature sufficiently high to melt hexagonal phase boron nitride. In the hot zone, the precursor particles melt to form molten particles that acquire spherical and polyhedral shapes. These molten particles exit the hot zone, cool, and solidify to form solid particles of boron nitride with spherical and polyhedral shapes. The molten particles can also collide and join to form larger molten particles that lead to larger spherical and polyhedral particles.

Method for Forming a Potential Hydrocarbon Sensor With Low Sensitivity to Methane and CO

Rangachary Mukundan (MST-11)
Eric L. Brosha (MST-11)
Fernando Garzon (MST-11)
U.S. Patent No. 6,656,336

A hydrocarbon sensor is formed with an electrolyte body having a first electrolyte surface with a reference electrode depending therefrom and a metal oxide electrode body contained within the electrolyte body and having a first electrode surface coplanar with the first electrolyte surface. The sensor is formed by forming a sintered metal-oxide electrode body and placing the metal-oxide electrode body within an electrolyte powder. The electrolyte powder with the metal-oxide electrode body is pressed to form a pressed electrolyte body containing the metal-oxide electrode body. The electrolyte is removed from an electrolyte surface above the metal-oxide electrode body to expose a metal-oxide electrode surface that is coplanar with the electrolyte surface. The electrolyte body and the metal-oxide electrode body are then sintered to form the hydrocarbon sensor.

Preparation of Energy Storage Materials

Lin Song Li (MST-STC)
Quanxi Jia (MST-STC)
U.S. Patent No. 6,656,390

A metallic oxide composite is produced by mixing an aqueous solution of a water-soluble metal compound and colloidal silica, depositing the mixture upon a substrate, heating the mixture-coated substrates at temperatures from about 150°C to about 300°C for time sufficient to form a metallic oxide film, and removing the silica from the metallic oxide film, whereby a porous metal oxide structure is formed.

3,6-Bis(1H,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine or Salt Thereof

Michael A. Hiskey (DX-2)
David E. Chavez (DX-2)
Darren Naud (DX-2)
U.S. Patent No. 6,657,059

The compound 3,6-bis(1H-1,2,3,4-tetrazol-5-ylamino)-1,2,4,5-tetrazine and its salts are provided together with a propellant composition including an oxidizer, a binder and 3,6-bis(1H-1,2,3,4-tetrazol-5-ylamino)-1,2,4,5-tetrazine or its salts.

Cascaded Thermoacoustic Devices

Gregory W. Swift (MST-10)
Scott N. Backhaus (MST-10)
David L. Gardner (MST-10)
U.S. Patent No. 6,658,862

A thermoacoustic device is formed with a resonator system defining at least one region of high specific acoustic impedance in an acoustic wave within the resonator system. A plurality of thermoacoustic units are cascaded together within the region of high specific acoustic impedance where at least one of the thermoacoustic units is a regenerator unit.

Particle Size Analysis in a Turbid Media with a Single-Fiber, Optical Probe While Using a Visible Spectrometer

Murat Canpolat (B-3)
Judith R. Mourant (B-3)
U.S. Patent No. 6,660,995

Scatterer size in a dense media is measured with only a single fiber for both light delivery and collection. White light is used as a source and oscillations of the detected light intensities are measured as a function of wavelength. The maximum and minimum of the oscillations can be used to determine scatterer size for monodisperse distributions of spheres when the refractive indices are known. In addition, several properties of the probe relevant to tissue diagnosis are disclosed including the effects of absorption, a broad distribution of scatterers, and the depth probed.

Method and Apparatus for Fine Tuning an Orifice Pulse Tube Refrigerator

Gregory W. Swift (MST-10)
John Wollan
U.S. Patent No. 6,666,033

An orifice pulse tube refrigerator uses flow resistance, compliance, and inertance components connected to a pulse tube for establishing a phase relationship between oscillating pressure and oscillating velocity in the pulse tube. A temperature regulating system heats or cools a working gas in at least one of the flow resistance and inertance components. A temperature control system is connected to the temperature regulating system for controlling the temperature of the working gas in one of the flow resistance and inertance components and maintaining a control temperature that is indicative of a desired temporal phase relationship.

Energetic Powder

Betty S. Jorgensen (DX-2)
Wayne C. Danen (DX-DO)
U.S. Patent No. 6,666,936

Fluoroalkylsilane-coated metal particles are produced with a central metal core, a buffer layer surrounding the core, and a fluoroalkylsilane layer attached to the buffer layer. The particles may be prepared by combining a chemically reactive fluoroalkylsilane compound with an oxide coated metal particle having a hydroxylated surface. The resulting fluoroalkylsilane layer that coats the particles provides them with excellent resistance to aging. The particles can be blended with oxidant particles to form energetic powder that releases chemical energy when the buffer layer is physically disrupted so that the reductant metal core can react with the oxidant.

Web-Based Multi-Channel Analyzer

Russell E. Gritzo (C-INC)
U.S. Patent No. 6,668,277

An improved multi-channel analyzer conveniently gathers, processes, and distributes spectrographic pulse data. The multi-channel analyzer may operate on a computer system connected to receive digitized spectrographic pulses. The multi-channel analyzer may have a software module that may receive digitized spectrographic pulses for at least 10,000 pulses per second. The multi-channel analyzer may further have a user-level software module to receive user-specified controls dictating the operation of the multi-channel analyzer, making the multi-channel analyzer customizable by the end-user.

Geothermal Energy Production with Supercritical Fluids

Donald W. Brown (EES-11)
U.S. Patent No. 6,668,554

Geothermal energy is produced using supercritical fluids for creation of the underground reservoir, production of the geothermal energy, and for heat transport. Underground reservoirs are created by pumping a supercritical fluid such as carbon dioxide into a formation to fracture the rock. Once the reservoir is formed, the same supercritical fluid is allowed to heat up and expand, then is pumped out of the reservoir to transfer the heat to a surface power generating plant or other application.

Photopolymerization-Based Fabrication of Chemical Sensing Films

Xiaoguang Yang (HSR-7)
Basil I. Swanson (B-4)
Xian Xian Du (B-4)
U.S. Patent No. 6,670,286

A photopolymerization method attaches a chemical microsensor film to an oxide surface including the steps of pretreating the oxide surface to form a functionalized surface, coating the functionalized surface with a prepolymer solution, and polymerizing the prepolymer solution with ultraviolet light to form the chemical microsensor film. The method also allows the formation of molecular imprinted films by photopolymerization. Formation of multilayer sensing films and patterned films is allowed by the use of photomasking techniques to allow patterning of multiple regions of a selected sensing film, or creating a sensor surface containing several films designed to detect different compounds.

Laser Ignition

James Early (DX-1)
Charles S. Lester (HR-S)
U.S. Patent No. 6,676,402

Sequenced pulses of light from an excitation laser are directed through a light modulator and a first polarizing analyzer. A portion of the light not rejected by the first polarizing analyzer is transported through a first optical fiber into a first ignitor laser rod in an ignitor laser. Another portion of the light is rejected by the first polarizing analyzer and directed through a halfwave plate into a second polarization analyzer. A first portion of the output of the second polarization analyzer passes through the second polarization analyzer to a second, oscillator, laser rod in the ignitor laser. A second portion of the output of the second polarization analyzer is redirected by the second polarization analyzer to a second optical fiber that delays the beam before the beam is combined with output of the first ignitor laser rod. Output of the second laser rod in the ignitor laser is directed into the first ignitor laser rod that was energized by light passing through the first polarizing analyzer. Combined output of the first ignitor laser rod and output of the second optical fiber is focused into a combustible fuel where the first short duration, high peak power pulse from the ignitor laser ignites the fuel and the second long duration, low peak power pulse directly from the excitation laser sustains the combustion.

Technology for Fabrication of a Micromagnet on a Tip of MFM/MRFM Probe

Denis V. Pelekhov (MST-10)
P. Chris Hammel (MST-10)
Geoffrey Nunes Jr.
Melissa M. Midzor (MST-10)
Michael Roukes
U.S. Patent No. 6,676,813

The tip of a mechanical resonator for use in magnetic force microscopy and magnetic resonance force microscopy with a ferromagnetic material and the cantilever is not coated by first coating the cantilever and incorporated tip with a photoresist, where surface tension keeps photoresist off the tip. The cantilever and tip are then coated with a magnetic material. Acetone is used then to lift off the magnetic material from the cantilever but not from the tip.

Speech Processing Using Conditional Observable Maximum Likelihood Continuity Mapping

John E. Hogden (CCS-3)
David A. Nix (CIC-3)
U.S. Patent No. 6,678,658

A computer implemented method enables the recognition of speech

and speech characteristics. Parameters are initialized for first probability density functions that map between the symbols in the vocabulary of one or more sequences of speech codes that represent speech sounds and a continuity map. Parameters are also initialized for second probability density functions that map between the elements in the vocabulary of one or more desired sequences of speech transcription symbols and the continuity map. The parameters of the probability density functions are then trained to maximize the probabilities of the desired sequences of speech-transcription symbols. A new sequence of speech codes is input to the continuity map having the trained first and second probability function parameters. A smooth path is identified on the continuity map that has the maximum probability for the new sequence of speech codes. The probability of each speech transcription symbol for each input speech code can then be output.

Meniscus Membranes for Separation

Robert C. Dye (DX-2)
Betty S. Jorgensen (DX-2)
David R. Pesiri (MST-7)
U.S. Patent No. 6,681,648

Gas separation membranes, especially meniscus-shaped membranes for gas separations are disclosed together with the use of such meniscus-shaped membranes for applications such as thermal gas valves, pre-concentration of a gas stream, and selective pre-screening of a gas stream. In addition, a rapid screening system for simultaneously screening polymer materials for effectiveness in gas separation is provided.

Method for Producing Metallic Nanoparticles

Jonathan Phillips (ESA-MEE)
William L. Perry (DX-2)
U.S. Patent No. 6,689,192

Metallic nanoparticles are produced by generating an aerosol of solid metallic microparticles, generating non-oxidizing plasma with a plasma hot zone at a temperature sufficiently high to vaporize the microparticles into metal vapor, and directing the aerosol into the hot zone of the plasma. The microparticles vaporize in the hot zone to metal vapor. The metal vapor is directed away from the hot zone and to the plasma afterglow where it cools and condenses to form solid metallic nanoparticles.

Crystalline Rare Earth Activated Lutetium Oxyorthosilicate Phosphors

Kenneth J. McClellan (MST-8)
D. Wayne Cooke (MST-8)
U.S. Patent No. 6,689,293

A crystalline, transparent, rare-earth activated lutetium oxyorthosilicate phosphor is formed that may be optically coupled to a photodetector to provide a radiation detector.

Catalyst Inks and Method of Application for Direct Methanol Fuel Cells

Piotr Zelenay (MST-11)
John R. Davey (MST-11)
Xiaoming Ren (MST-11)
Shimshon Gottesfeld (MST-11)
Sharon C. Thomas (MST-11)
U.S. Patent No. 6,696,382

Inks are formulated for forming anode and cathode catalyst layers and applied to anode and cathode sides of a membrane for a direct methanol fuel cell. The inks are prepared in a two-step process while cooling and agitating the solutions. The final solution is placed in a cooler and continuously agitated while spraying the solution over the anode or cathode surface of the membrane as determined by the catalyst content.

Methods and Optical Fibers that Decrease Pulse Degradation Resulting from Random Chromatic Dispersion

Michael Chertkov (T-13)
Ildar R. Gabitov (T-7)
U.S. Patent No. 6,701,050

An actual (random) accumulated chromatic dispersion of an optical fiber is pinned to a predicted accumulated dispersion of the fiber through relatively simple modifications of fiber-optic manufacturing methods or retrofitting of existing fibers. If the pinning occurs with

sufficient frequency (at a distance less than or equal to a correlation scale), pulse degradation resulting from random chromatic dispersion is minimized. Alternatively, pinning may occur quasi-periodically, i.e., the pinning distance is distributed between approximately zero and approximately two to three times the correlation scale.

Synthesis of Labeled Metabolites

Rodolfo A. Martinez (B-3)
Louis A. Silks III (B-3)
Clifford J. Unkefer (B-3)
Robert W. Atcher (B-3)
U.S. Patent No. 6,709,645

This invention is directed to labeled compounds, for example, isotopically enriched mustard gas metabolites.

Synthesis of $[^2H_1,^{13}C]$, $[^2H_2,^{13}C]$ and $[^2H_3,^{13}C]$ Methylaryl Sulfides

Rodolfo A. Martinez (B-3)
Marc A. Alvarez (B-3)
Louis A. Silks III (B-3)
Clifford J. Unkefer (B-3)
U.S. Patent No. 6,713,044

The present invention is directed to labeled compounds of methylaryl sulfides and methyl iodide.

High Temperature Superconducting Composite Conductors

Terry G. Holesinger (MST-STC)
Stephen R. Foltyn (MST-STC)
Paul N. Arendt (MST-STC)
James R. Groves (MST-STC)
Quanxi Jia (MST-STC)
Alicia Ayala (NHMFL)
U.S. Patent No. 6,716,545

Copper or excess copper is added to one or more layers of a superconducting composite structure to reduce migration of copper from a copper based superconducting layer.

Catalysts for Lean Burn Engine Exhaust Abatement

Kevin C. Ott (C-SIC)
Noline C. Clark (C-SIC)
Mark T. Paffett (C-SIC)
U.S. Patent No. 6,716,783

Nitrogen oxides in an exhaust gas stream containing nitrogen oxides and a reductant material are catalytically reduced by contacting the gas stream under conditions effective to catalytically reduce the nitrogen oxides with a catalyst comprising an aluminum-silicate type material and a minor amount of a metal, the catalyst characterized as having sufficient catalytic activity so as to reduce the nitrogen oxides by at least 60 percent under temperatures within the range of from about 200°C to about 400°C.

Maximum Likelihood Density Modification by Pattern Recognition of Structural Motifs

Thomas C. Terwilliger (B-2)
U.S. Patent No. 6,721,664

An electron density map for a crystallographic structure having protein regions and solvent regions is improved by maximizing the log likelihood of a set of structures factors using a local log-likelihood function that includes the probability that there is a structural motif at a known location, with a known orientation in the vicinity of a point x and a probability distribution for electron density at this point given that the structural motif actually is present. One appropriate structural motif is a helical structure within the crystallographic structure.

Speech Recovery Device

Christen M. Frankle (P-22)
U.S. Patent No. 6,724,898

Speech recovery in people with inability to speak due to aphasia, apraxia or another condition with similar effect is assisted using a hollow, rigid, thin-walled tube with semi-circular or semi-elliptical cut out shapes at each open end, positioned such that one end mates with the throat/voice box area of the neck of the assistor and the other end mates with the throat/voice box area of the assisted. The speaking person (assistor) makes sounds that produce standing wave vibrations

at the same frequency in the vocal cords of the assisted person. Driving the assisted person's vocal cords with the assisted person being able to hear the correct tone enables the assisted person to speak by simply amplifying the vibration of membranes in their throat.

Surface Control Alloy Substrates and Methods of Manufacture Therefore

Paul N. Arendt (MST-STC)
Stephen R. Foltyn (MST-STC)
Leslie Fritzemeier
Qi Li
Martin W. Rupich
Elliott R. Thompson
Edward J. Siegal
Cornelis Hans Thieme
Suresh Annavarapu
U.S. Patent No. 6,730,410

The surface of an alloy substrate for deposition of an epitaxial layer is controlled using an intermediate layer to stabilize the substrate surface against oxidation for subsequent deposition of an epitaxial layer.

Synthesis of ^{2}H and ^{13}C Substituted Compounds

Rodolfo A. Martinez (B-3)
Marc A. Alvarez (B-3)
Louis A. Silks III (B-3)
Clifford J. Unkefer (B-3)
U.S. Patent No.6,730,805

The present invention is directed to labeled compounds, [2-^{13}C]dithane wherein the ^{13}C atom is directly bonded to one or two deuterium atoms. The present invention is also directed to processes of preparing [2-^{13}C]dithane wherein the ^{13}C atom is directly bonded to one or two deuterium atoms. The present invention is also directed to labeled compounds, e.g., [$^{2}H_{1-2}$, ^{13}C] methanol (arylthio)-, acetates wherein the ^{13}C atom is directly bonded to exactly one or two deuterium atoms.

Traveling-Wave Thermoacoustic Engines with Internal Combustion

Nathan Weiland
Ben Zinn
Gregory W. Swift (MST-10)
U.S. Patent No. 6,732,515

Thermoacoustic devices are disclosed wherein, for some embodiments, a combustion zone provides heat to a regenerator using a mean flow of compressible fluid. In other embodiments, burning of a combustible mixture within the combustion zone is pulsed in phase with the acoustic pressure oscillations to increase acoustic power output. In an example embodiment, the combustion zone and the regenerator are thermally insulated from other components within the thermoacoustic device.

Method and Apparatus for Separating Mixtures of Gases Using an Acoustic Wave

Drew A. Geller (ESA-TSE)
Gregory W. Swift (MST-10)
Scott N. Backhaus (MST-10)
U.S. Patent No. 6,733,569

A thermoacoustic device separates a mixture of gases. An elongated duct is provided with first and second ends and has a length that is greater than the wavelength of sound in the mixture of gases at a selected frequency, and a diameter that is greater than a thermal penetration depth in the mixture of gases. A first acoustic source is located at the first end of the duct to generate acoustic power at the selected frequency. A plurality of side branch acoustic sources are spaced along the length of the duct and are configured to introduce acoustic power into the mixture of gases so that a first gas is concentrated at the first end of the duct and a second gas is concentrated at the second end of the duct.

Pulsed, Atmospheric Pressure Plasma Source for Emission Spectrometry

Yixiang Duan (C-ACS)
Zhe Jin (C-ACS)
Yongxuan Su (C-ACS)
U.S. Patent No. 6,734,964

A low-power, plasma source-based, portable molecular light emission generator/detector employing an atmospheric pressure pulsed-plasma

for molecular fragmentation and excitation is described. The average power required for the operation of the plasma is between 0.02 W and 5 W. The features of the optical emission spectra obtained with the pulsed plasma source are significantly different from those obtained with direct current (dc) discharge higher power; for example, strong CH emission at 431.2 nm which is only weakly observed with dc plasma sources was observed, and the intense CN emission observed at 383-388 nm using dc plasma sources was weak in most cases. Strong CN emission was only observed using the present apparatus when compounds containing nitrogen, such as aniline were employed as samples. The present apparatus detects dimethylsulfoxide at 200 ppb using helium as the plasma gas by observing the emission band of the CH radical. When coupled with a gas chromatograph for separating components present in a sample to be analyzed, the present invention provides an apparatus for detecting the arrival of a particular component in the sample at the end of the chromatographic column and the identity thereof.

Tuning the Properties of Conjugated Polyelectrolytes and Application in a Biosensor Platform

Liaohai Chen (B-4)
U.S. Patent No. 6,737,279

The present invention provides a method of detecting a biological agent including contacting a sample with a sensor including a polymer system capable of having an alterable measurable property from the group of luminescence, anisotropy, redox potential and uv/vis absorption, the polymer system including an ionic conjugated polymer and an electronically inert polyelectrolyte having a biological agent recognition element bound thereto, the electronically inert polyelectrolyte adapted for undergoing a conformational structural change upon exposure to a biological agent having affinity for binding to the recognition element bound to the electronically inert polyelectrolyte, and, detecting the detectable change in the alterable measurable property. A chemical moiety being the reaction product of (i) a polyelectrolyte monomer and (ii) a biological agent recognition element-substituted polyelectrolyte monomer is also provided.

Oriented Conductive Oxide Electrodes on SiO_2/Si and Glass

Quanxi Jia (MST-STC)
Paul N. Arendt (MST-STC)
U.S. Patent No. 6,743,292

A thin film structure is provided including a silicon substrate with a layer of silicon dioxide on a surface thereof, and a layer of cubic oxide material deposited upon the layer of silicon dioxide by ion-beam-assisted-deposition, said layer of cubic oxide material characterized as biaxially oriented. Preferably, the cubic oxide material is yttria-stabilized zirconia. Additional thin layers of biaxially oriented ruthenium oxide or lanthanum strontium cobalt oxide are deposited upon the layer of yttria-stabilized zirconia. An intermediate layer of cerium oxide is employed between the yttria-stabilized zirconia layer and the lanthanum strontium cobalt oxide layer. Also, a layer of barium strontium titanium oxide can be upon the layer of biaxially oriented ruthenium oxide or lanthanum strontium cobalt oxide.

Method for the Detection of Specific Nucleic Acid Sequences by Polymerase Nucleotide Incorporation

Alonso Castro (P-21)
U.S. Patent No. 6,743,578

A method for rapid and efficient detection of a target DNA or RNA sequence is provided. A primer having a 3'-hydroxyl group at one end and having a sequence of nucleotides sufficiently homologous with an identifying sequence of nucleotides in the target DNA is selected. The primer is hybridized to the identifying sequence of nucleotides on the DNA or RNA sequence and a reporter molecule is synthesized on the target sequence by progressively binding complementary nucleotides to the primer, where the complementary nucleotides include nucleotides labeled with a fluorophore. Fluorescence emitted by fluorophores on single reporter molecules is detected to identify the target DNA or RNA sequence.

Carbon Dioxide-Soluble Polymers and Swellable Polymers for Carbon Dioxide

Joseph Desimone
Eva Birnbaum (C-INC)
Ruben Carbonell
Stephanie Crette
James McClain
Thomas McCleskey (C-SIC)
Kimberly Powell (C-SIC)
Timothy Romack
William Tumas (C-SIC)
U.S. Patent No. 6,747,179

A method for carrying out a catalysis reaction in carbon dioxide comprising contacting a fluid mixture with a catalyst bound to a polymer, the fluid mixture comprising at least one reactant and carbon dioxide, wherein the reactant interacts with the catalyst to form a reaction product. A composition of matter comprises carbon dioxide and a polymer and a reactant present in the carbon dioxide. The polymer has bound thereto a catalyst at a plurality of chains along the length of the polymer, and wherein the reactant interacts with the catalyst to form a reaction product.

Method and Apparatus for Free-Space Quantum Key Distribution in Daylight

Richard J Hughes (P-21)
William T. Buttler (P-23)
Paul G. Kwiat (P-23)
Steve K. Lamoreaux (P-23)
George L. Morgan (P-23)
Jane E. Nordholt (P-21)
Charles G. Peterson (P-21)
U.S. Patent No. 6,748,083

A quantum cryptography apparatus securely generates a key to be used for secure transmission between a sender and a receiver connected by an atmospheric transmission link. A first laser outputs a timing bright light pulse; other lasers output polarized optical data pulses after having been enabled by a random bit generator. Output optics transmit output light from the lasers that is received by receiving optics. A first beam splitter receives light from the receiving optics, where a received timing bright light pulse is directed to a delay circuit for establishing a timing window for receiving light from the lasers and where an optical data pulse from one of the lasers has a probability of being either transmitted by the beam splitter or reflected by the beam splitter. A first polarizer receives transmitted optical data pulses to output one data bit value and a second polarizer receives reflected optical data pulses to output a second data bit value. A computer receives pulses representing receipt of a timing bright timing pulse and the first and second data bit values, where receipt of the first and second data bit values is indexed by the bright timing pulse.

Transmission of Digital Images Within the NTSC Analog Format

George H. Nickel (P-22)
U.S. Patent No. 6,751,256

HDTV and NTSC compatible image communication is done in a single NTSC channel bandwidth. Luminance and chrominance image data of a scene to be transmitted is obtained. The image data is quantized and digitally encoded to form digital image data in HDTV transmission format having low-resolution terms and high-resolution terms. The low-resolution digital image data terms are transformed to a voltage signal corresponding to NTSC color subcarrier modulation with retrace blanking and color bursts to form a NTSC video signal. The NTSC video signal and the high-resolution digital image data terms are then transmitted in a composite NTSC video transmission. In a NTSC receiver, the NTSC video signal is processed directly to display the scene. In a HDTV receiver, the NTSC video signal is processed to invert the color subcarrier modulation to recover the low-resolution terms, where the recovered low-resolution terms are combined with the high-resolution terms to reconstruct the scene in a high definition format.

Synthesis of Labeled Oxalic Acid Derivates

Rodolfo A. Martinez (B-3)
Clifford J. Unkefer (B-3)
Marc A. Alvarez (B-3)
U.S. Patent No. 6,753,446

The present invention is directed to labeled compounds, specifically ##STR1## where each C* is selected from the group consisting of a carbon-12, i.e., ^{12}C, or a carbon-13, i.e., ^{13}C and at least one C* is ^{13}C, R^1 is selected from the group of C_1 -C_4 lower alkyl and aryl, and X is selected from the group of --NR^2R^3 where R^2 and R^3 are each independently selected from the group of C_1 -C_4 lower alkyl, alkoxy and aryl, --SR^4 where R^4 is selected from the group of C_1 -C_4 lower alkyl, alkoxy and aryl, and --OR^5 where R^5 is selected from the group of C_1 -C_4 lower alkyl, alkoxy and aryl with the proviso that when R^1 is methyl then R^5 is other than methyl, when R^1 is ethyl then R^5 is other than ethyl, and when R^1 is benzyl then R^5 is other than benzyl.

Dynamic Time Expansion and Compression using Nonlinear Waveguides

Alp T. Findikoglu (MST-STC)
Sangkoo F. Hahn (ISR-4)
Quanxi Jia (MST-STC)
U.S. Patent No. 6,753,741

Dynamic time expansion or compression of a small-amplitude input signal generated with an initial scale is performed using a nonlinear waveguide. A nonlinear waveguide having a variable refractive index is connected to a bias voltage source having a bias signal amplitude that is large relative to the input signal to vary the reflective index and concomitant speed of propagation of the nonlinear waveguide and an electrical circuit for applying the small-amplitude signal and the large amplitude bias signal simultaneously to the nonlinear waveguide. The large amplitude bias signal with the input signal alters the speed of propagation of the small-amplitude signal with time in the nonlinear waveguide to expand or contract the initial time scale of the small-amplitude input signal.

Pulsed Width Modulated Push-Pull Driven Parallel Resonant Converter with Active Free Wheel

William A. Reass (LANSCE-5)
Louis S. Schrank (P-24)
U.S. Patent No. 6,754,091

An apparatus and method for high frequency alternating power generation to control kilowatts of supplied power in microseconds. The present invention includes a means for energy storage, push-pull switching means, control electronics, transformer means, resonant circuitry and means for excess energy recovery, all in electrical communication. A push-pull circuit works synchronously with a force commutated free-wheel transistor to provide current pulses to a transformer. A change in the conduction angle of the push-pull circuit changes the amount of energy coupled into the transformer's secondary oscillating circuit, thereby altering the induced secondary resonating voltage. At the end of each pulse, the force commutated free-wheel transistor causes residual excess energy in the primary circuit to be transmitted back to the storage capacitor for later use.

Method for Producing Metallic Particles

Jonathan Phillips (ESA-WMM)
William L. Perry (DX-2)
William J. Kroenke (UNM)
U.S. Patent No. 6,755,886

Method for producing metallic particles. The method converts metallic nanoparticles into larger, spherical metallic particles. An aerosol of solid metallic nanoparticles and a non-oxidizing plasma having a portion sufficiently hot to melt the nanoparticles are generated. The aerosol is directed into the plasma where the metallic nanoparticles melt, collide, join, and spheroidize. The molten spherical metallic particles are directed away from the plasma and enter the afterglow where they cool and solidify.

Buffer Layers on Metal Alloy Substrates for Superconducting Tapes

Quanxi Jia (MST-STC)
Stephen R. Foltyn (MST-STC)
Paul N. Arendt (MST-STC)
James R. Groves (MST-STC)
U.S. Patent No. 6,756,139

An article including a substrate, a layer of an inert oxide material upon the surface of the substrate, a layer of an amorphous oxide or oxynitride material upon the inert oxide material layer, a layer of an oriented cubic oxide material having a rock-salt-like structure upon the amorphous oxide material layer, and a layer of a $SrRuO_3$ buffer material upon the oriented cubic oxide material layer is provided together with additional layers such as a HTS top-layer of YBCO directly upon the layer of a $SrRuO_3$ buffer material layer. With a HTS top-layer of YBCO upon at least one layer of the $SrRuO_3$ buffer material in such an article, J_c 's of up to 1.3.times.10^6 A/cm^2 have been demonstrated with projected IC's of over 200 Amperes across a sample 1 cm wide.

Bulk Superhard B-C-N Nanocomposite Compact and Method for Preparing Thereof

Yusheng Zhao (LANSCE-12)
Duanwei He (LANSCE-12)
U.S. Patent No. 6,759,128

Bulk, superhard, B-C-N nanocomposite compact and method for preparing thereof. The bulk, superhard, nanocomposite compact is a well-sintered compact and includes nanocrystalline grains of at least one high-pressure phase of B-C-N surrounded by amorphous diamond-like carbon grain boundaries. The bulk compact has a Vicker's hardness of about 41-68 GPa. It is prepared by ball milling a mixture of graphite and hexagonal boron nitride, encapsulating the ball-milled mixture, and sintering the encapsulated ball-milled mixture at a pressure of about 5-25 GPa and at a temperature of about 1000-2500 K.

Nondegenerate Four-Wave Mixing Using Photoinduced Charge Transfer Materials

Eric S. Maniloff (C-PCS)
Duncan W. McBranch (C-PCS)
Alan J. Heeger (STB-DSTBP)
Dan V. Vacar
U.S. Patent No. 6,761,999

Charge-transfer materials are demonstrated to be useful for generating femtosecond holographic gratings. Using semiconducting polymers sensitized with varying concentrations of C_{60}, absorption holographic gratings with diffraction efficiencies of 1.6% were recorded with individual ultrafast laser pulses; the diffraction efficiency and time decay of the gratings were measured using nondegenerate four-wave mixing. High quantum efficiency for electron transfer reduces the effects of early recombination which otherwise limits the density of excitations in pure polymers, and the metastability of the charge transfer enables tuning of the decay dynamics by controlling the concentration of acceptors in the mixture.

Synthesis of [$^2H_1$,^{13}C], [$^2H_2$,^{13}C] and [$^2H_3$,^{13}C] Methylaryl Sulfones and Sulfoxides

Rodolfo A. Martinez (B-3)
Marc A. Alvarez (B-3)
Louis A. Silks III (B-3)
Clifford J. Unkefer (B-3)
Jurgen G. Schmidt (B-3)
U.S. Patent No. 6,764,673

The present invention is directed to labeled compounds, [$^2H_1$,^{13}C], [$^2H_2$,^{13}C] and [$^2H_3$,^{13}C]methyl aryl sulfones and [$^2H_1$,^{13}C], [$^2H_2$,^{13}C] and [$^2H_3$,^{13}C]methyl aryl sulfoxides, wherein the ^{13}C methyl group attached to the sulfur of the sulfone or sulfoxide includes exactly one, two or three deuterium atoms and the aryl group is selected from the group consisting of 1-naphthyl, substituted 1-naphthyl, 2-naphthyl, substituted 2-naphthyl, and phenyl groups with the structure: ##STR1## wherein R_1, R_2, R_3, R_4 and R_5 are each independently, hydrogen, a C_1 -C_4 lower alkyl, a

halogen, an amino group from the group consisting of NH_2, NHR and NRR' where R and R' are each a C_1 -C_4 lower alkyl, a phenyl, or an alkoxy group. The present invention is also directed to processes of preparing methylaryl sulfones and methylaryl sulfoxides.

Remote Down-Hole Well Telemetry

Scott D. Briles (ISR-3)
Daniel L. Neagley (ISR-3)
Don Coates (P-DO)
Samuel M. Freund (LC-IP)
U.S. Patent 6,766,141

The present invention includes an apparatus and method for telemetry communication with oil-well monitoring and recording instruments located in the vicinity of the bottom of gas or oil recovery pipes. Such instruments are currently monitored using electrical cabling that is inserted into the pipes; cabling has a short life in this environment, and requires periodic replacement with the concomitant, costly shutdown of the well. Modulated reflectance, a wireless communication method that does not require signal transmission power from the telemetry package will provide a long-lived and reliable way to monitor down-hole conditions. Normal wireless technology is not practical since batteries and capacitors have to frequently be replaced or recharged, again with the well being removed from service. RF energy generated above ground can also be received, converted and stored down-hole without the use of wires, for actuating down-hole valves, as one example. Although modulated reflectance reduces or eliminates the loss of energy at the sensor package because energy is not consumed, during the transmission process, additional stored extra energy down-hole is needed.

Detection of Phenols Using Engineered Bacteria

Arlene A. Wise (B-7)
Cheryl R. Kuske (B-1)
Thomas C. Terwilliger (B-2)
U.S. Patent No. 6,773,918

Detection of phenols using engineered bacteria. A biosensor can be created by placing a reporter gene under control of an inducible promoter. The reporter gene produces a signal when a cognate transcriptional activator senses the inducing chemical. Creation of bacterial biosensors is currently restricted by limited knowledge of the genetic systems of bacteria that catabolize xenobiotics. By using mutagenic PCR to change the chemical specificity of the Pseudomonas species CF600 DmpR protein, the potential for engineering novel biosensors for detection of phenols has been demonstrated. DmpR, a well-characterized transcriptional activator of the P. CF600's dmp operon mediates growth on simple phenols. Transcription from Po, the promoter heading the dmp operon, is activated when the sensor domain of DmpR interacts with phenol and mono-substituted phenols. By altering the sensor domain of the DmpR, a group of DmpR derivatives that activate transcription of a Po-lacZ fusion in response to eight of the EPA's eleven priority pollutant phenols has been created. The assays and the sensor domain mutations that alter the chemical specificity of DmpR is described.

Volatile Chemical Reagent Detector

Liaohai Chen (B-4)
Duncan McBranch (C-PCS)
Rong Wang (B-4)
David G. Whitten (B-4)
U.S. Patent No. 6,780,379

A device for detecting volatile chemical reagents based on fluorescence quenching analysis that is capable of detecting neutral electron acceptor molecules. The device includes a fluorescent material, a contact region, a light source, and an optical detector. The fluorescent material includes at least one polymer-surfactant complex. The polymer-surfactant complex is formed by combining a fluorescent ionic conjugated polymer with an oppositely charged surfactant. The polymer-surfactant complex may be formed in a polar solvent and included in the fluorescent material as a solution. Alternatively, the complex may be included in the fluorescent material as a thin film. The use of a polymer-surfactant complex in the fluorescent material allows the device to detect both neutral and ionic acceptor molecules. The use of a polymer-surfactant complex film allows the device and the fluorescent material to be reusable after exposing the fluorescent material to a vacuum for limited time.

Handheld CZT Radiation Detector

William S. Murray (N-2)
Kenneth B. Butterfield (N-2)
William Baird (N-2)
U.S. Patent No. 6,781,134

A handheld CZT radiation detector having a CZT gamma-ray sensor, a multichannel analyzer, a fuzzy-logic component, and a display component is disclosed. The CZT gamma-ray sensor may be a coplanar grid CZT gamma-ray sensor, which provides high-quality gamma-ray analysis at a wide range of operating temperatures. The multichannel analyzer categorizes pulses produced by the CZT gamma-ray sensor into channels (discrete energy levels), resulting in pulse height data. The fuzzy-logic component analyzes the pulse height data and produces a ranked listing of radioisotopes. The fuzzy-logic component is flexible and well-suited to in-field analysis of radioisotopes. The display component may be a personal data assistant, which provides a user-friendly method of interacting with the detector. In addition, the radiation detector may be equipped with a neutron sensor to provide an enhanced mechanism of sensing radioactive materials.

Optimizing the Availability of a Buffered Industrial Process

Harry F. Martz Jr. (D-1)
Michael Scott Hamada (D-1)
Arthur J. Koehler
Eric Berg
U.S. Patent No. 6,782,295

A computer-implemented process determines optimum configuration parameters for a buffered industrial process. A population size is initialized by randomly selecting a first set of design and operation values associated with subsystems and buffers of the buffered industrial process to form a set of operating parameters for each member of the population. An availability discrete event simulation (ADES) is performed on each member of the population to determine the product-based availability of each member. A new population is formed having members with a second set of design and operation values related to the first set of design and operation values through a genetic algorithm and the product-based availability determined by the ADES. Subsequent population members are then determined by iterating the genetic algorithm with product-based availability determined by ADES to form improved design and operation values from which the configuration parameters are selected for the buffered industrial process.

Magnetic Vector Field Tag and Seal

Roger G. Johnston (C-ADI)
Anthony R. E. Garcia (C-ADI)
Patent 6,784,796

One or more magnets are placed in a container (preferably on objects inside the container) and the magnetic field strength and vector direction are measured with a magnetometer from at least one location near the container to provide the container with a magnetic vector field tag and seal. The location(s) of the magnetometer relative to the container are also noted. If the position of any magnet inside the container changes, then the measured vector fields at these locations also change, indicating that the tag has been removed, the seal has broken, and therefore the container and objects inside may have been tampered with. A hollow wheel with magnets inside may also provide a similar magnetic vector field tag and seal. As the wheel turns, the magnets tumble randomly inside, removing the tag and breaking the seal.

Hydrogen Production From Carbonaceous Material

Klaus S. Lackner (T)
Hans J. Ziock (EES-6)
Douglas P. Harrison (non-LANL)
U.S. Patent No. 6,790,430

Hydrogen is produced from solid or liquid carbon-containing fuels in a two-step process. The fuel is gasified with hydrogen in a hydrogenation reaction to produce a methane-rich

gaseous reaction product, which is then reacted with water and calcium oxide in a hydrogen production and carbonation reaction to produce hydrogen and calcium carbonate. The calcium carbonate may be continuously removed from the hydrogen production and carbonation reaction zone and calcined to regenerate calcium oxide, which may be reintroduced into the hydrogen production and carbonation reaction zone. Hydrogen produced in the hydrogen production and carbonation reaction is more than sufficient both to provide the energy necessary for the calcination reaction and also to sustain the hydrogenation of the coal in the gasification reaction. The excess hydrogen is available for energy production or other purposes. Substantially all of the carbon introduced as fuel ultimately emerges from the invention process in a stream of substantially pure carbon dioxide. The water necessary for the hydrogen production and carbonation reaction may be introduced into both the gasification and hydrogen production and carbonation reactions, and allocated so as to transfer the exothermic heat of reaction of the gasification reaction to the endothermic hydrogen production and carbonation reaction.

Method for Producing Chemical Energy

Betty S. Jorgensen (DX-2)
Wayne C. Danen (DX-DO)
U.S. Patent No. 6,792,867

Fluoroalkylsilane-coated metal particles having a central metal core, a buffer layer surrounding the core, and a fluoroalkylsilane layer attached to the buffer layer are prepared by combining a chemically reactive fluoroalkylsilane compound with an oxide coated metal particle having a hydroxylated surface. The resulting fluoroalkylsilane layer that coats the particles provides them with excellent resistance to aging. The particles can be blended with oxidant particles to form energetic powder that releases chemical energy when the buffer layer is physically disrupted so that the reductant metal core can react with the oxidant.

Sample Collection System for Gel Electrophoresis

José A. Olivares (BC-DO)
Peter C. Stark (C-ACT)
John M. Dunbar (B-1)
Karen K. Hill (B-1)
Cheryl R. Kuske (B-1)
Gustavo A. Roybal (C-ACT)
U.S. Patent No. 6,793,790

An automatic sample collection system for use with an electrophoretic slab gel system is presented. The collection system can be used with a slab gel have one or more lanes. A detector is used to detect particle bands on the slab gel within a detection zone. Such detectors may use a laser to excite fluorescently labeled particles. The fluorescent light emitted from the excited particles is transmitted to low-level light detection electronics. Upon the detection of a particle of interest within the detection zone, a syringe pump is activated, sending a stream of buffer solution across the lane of the slab gel. The buffer solution collects the sample of interest and carries it through a collection port into a sample collection vial.

Permeable Polyaniline Articles for Gas Separation

Hsing-Lin Wang (B-4)
Benjamin R. Mattes (C-PCS)
U.S. Patent No. 6,797,325

Immersion precipitation of solutions having 15%-30% (w/w) and various molecular weights of the emeraldine base form of polyaniline in polar aprotic solvents are shown to form integrally skinned asymmetric membranes and fibers having skin layers <1 μm thick which exhibit improved rates of gas transport while preserving good selectivity. These membranes can be further transformed by an acid doping process after fabrication to achieve excellent permeation rates and high selectivities for particular gas separations. Prior to the use of concentrated EB solutions, the formation of integrally skinned asymmetric membranes was not possible, since films and fibers made from <5% w/w polyaniline solutions were found to disintegrate during the IP process.

Distinguished Awards

Distinguished Patent Award

The Distinguished Patent Award honors inventors whose patented invention exhibits outstanding innovation. The award is selected by the Laboratory Fellows and recognizes a premier patent exemplifying significant technical advance, adaptability to public use, and noteworthy value to the mission of Los Alamos National Laboratory. The patent and the inventors recognized for this award reflect the Laboratory's stalwart tradition of superior technical innovation and creativity.

2004 Award Winners

Dr. Arlene Wise, formerly of the Biosciences Division, and collaborators Drs. Tom Terwilliger and Cheryl Kuske, also of the Biosciences Division, are the recipients of the 2004 Distinguished Patent Award for their patent "Detection of Phenols Using Engineered Bacteria."

The past 30 years have seen a significant strengthening of government regulations that hold industrial entities accountable for chemical pollution. Among the most common and potent industrial pollutants are a class of toxic organic chemicals including phenol and various derivatives of phenol, such as chlorophenols and nitrophenols. These compounds are widely used in the manufacture of dyes, photographic chemicals, pesticides, herbicides and lumber preservatives, and are extremely toxic to the environment, even at very low levels, causing irreversible damage to wildlife and water resources. Prior to the inventors' work, only costly and technically complex chromatographic methods were available for detecting contamination.

The patent covers the creation of novel bacteria capable of detecting the presence of a number of phenolic compounds at the low levels typically found in contaminated soil and water. Recognizing that certain types of bacteria had evolved the capacity to use certain toxic chemicals as food sources, and that the production of the required metabolic enzymes is controlled by particular regulatory proteins that detect toxic chemicals through direct physical interaction, Wise and colleagues set out to identify and genetically engineer regulatory proteins that could be capable of detecting the group of phenolic compounds listed as priority pollutants by the Environmental Protection Agency.

Wise et al. worked with the bacterial regulatory protein DmpR. In its natural form, the DmpR protein cannot detect phenolic compounds at the low levels present in contaminated soil and water and cannot detect a number of the priority phenolic pollutants at all. Wise et al. set out to create slightly modified structural variants of the DmpR protein with the aim of creating some that would be able to detect these pollutants. To achieve this, they engineered a specific domain of the DmpR protein gene, the "sensor domain," at the DNA level, by applying a targeted PCR mutagenesis technique in order to create a large number of DmpR variant genes.

These variant DmpR genes were then individually incorporated into bacteria, in tandem with operable reporter genes capable of displaying a "reporter" function, such as a blue color, when the bacteria encounter a phenolic compound. A "library" of bacterial clones created in this way were tested for their ability to recognize any of the priority pollutant phenolic compounds at various concentrations in soil and liquid.

Several bacterial clones carrying mutant DmpR genes exhibited the capacity to detect phenolic compounds that wild-type bacteria do not detect, and several showed the ability to detect phenolic compounds at sensitivities up to 60 times greater than their wild-type counterparts. Targeting the sensor domain for mild DNA mutagenesis proved to be key in generating these high performing bacteria. In all, these inventors created a suite of mutant bacteria useful in detecting low concentrations of the EPA's phenolic priority pollutant chemicals, thus enabling inexpensive biosensor detection of contaminated soil and water.

Distinguished Licensing Award

The Distinguished Licensing Award recognizes innovators who proactively engage in commercialization activities at Los Alamos National Laboratory and who have had a positive impact on the Laboratory's Licensing Program. These individuals, by example, demonstrate outstanding success in transferring Laboratory-developed technologies to the public and private sectors. In addition, recipients' commercialization track record has served to enhance the reputations of both the University of California and the Laboratory.

Nominees for this award are evaluated based on ongoing active engagement in the licensing process; active participation in the promotion of their technologies; number of technologies licensed; number of licenses per technology; and support for multiple uses of the licensed technologies (private and public).

The recipients of this distinguished award are champions for the Laboratory's licensing program and are recognized for their role in confirming the benefits of proactive technology commercialization activities.

2004 Award Winners

Harry Martz Jr. and Michael Hamada of the Statistical Sciences group (D-1) within the Decision Application Division are joint winners of the 2004 Distinguished Licensing Award. Martz and Hamada are the principal team members in an ongoing collaboration with Procter & Gamble (P&G) to develop innovative manufacturing reliability methods and systems.

The primary product of the P&G research collaboration, PowerfactoRE, comprises a suite of reliability engineering methods, statistical and analytical tools, simulation software, customized procedures, and training to help manufacturing line managers understand reliability losses and prevent problems before they occur. Subsequent to executing a license agreement with LANL, P&G has implemented PowerFactoRE in more than 200 manufacturing plants worldwide.

PowerFactoRE has enabled P&G to save more than $1 billion in operating costs since implementation. The Laboratory's ability to meet its mission needs in stockpile stewardship has also benefited through improved expertise and retained government use rights from the collaboration.

The technical success and large economic benefit of PowerFactoRE have led to a multitude of additional agreements between LANL and P&G. Interactions between P&G and LANL have expanded over the course of PowerFactoRE's decade-long development to include more than a dozen agreements valued at almost $30 million in technology areas from molecular modeling to bioinformatics. P&G has sublicensed the technology to a major consulting firm, Bering Point, which now markets the PowerFactoRE technology to other leading manufacturing companies.

In 2003, R&D Magazine selected PowerFactoRE for an R&D 100 Award as one of the world's top 100 scientific and technological advances to show the most significant commercial potential during the preceding year. In 2004, Martz and Hamada received a Council for Chemical Research Award for Government/Industry Collaboration

for their work in developing PowerFactoRE.

The exemplary work of Harry Martz Jr. and Michael Hamada sets a standard of excellence in support of the Laboratory's technology transfer mission.

Distinguished Entrepreneur Award

The Distinguished Entrepreneur Award honors an individual or group of individuals whose hard work, ingenuity, innovation, and perseverance have contributed significantly to the Laboratory's ongoing efforts in commercialization and entrepreneurship, specifically in our region. These distinguished entrepreneurs have demonstrated substantial financial and personal risk taking, innovative and creative thinking, professional business planning, the highest integrity in their business dealings, and the intent to contribute to the regional economy through the creation of wealth and new jobs.

Award winners are pioneers in helping to create a new and vibrant entrepreneurial community in northern New Mexico. In addition, they serve as successful role models for others considering the pursuit of an entrepreneurial venture in the region.

2004 Award Winner

Doxcelerate, a Los Alamos National Laboratory spin-off company, has been selected as the recipient of the 2004 Distinguished Entrepreneur Award. In 2000, three Laboratory employees took the plunge via the Laboratory's Entrepreneurial Leave of Absence program to join the small company in order to accelerate its product growth and market penetration. Jim McDonald, Rebecca Hults, and Marilyn Pruitt joined the company as Vice President of Business Development, Senior Applications Engineer, and Director of Product Management and Customer Service, respectively. All three were part of a group at LANL that developed the early software that was the basis for the service the company offers its clients. In addition to these three, Thierry Theilliez, Steve Donahue, and Leon Sonntag opted to take the risk of leaving secure Laboratory positions to explore the entrepreneurial world. This award recognizes the group for their courage to "take the leap," their ability to grow the business in the region, and their tenacity to grow and sustain a business in northern New Mexico.

"As long as Congress makes laws, we can make money" is Doxcelerate's catchphrase. The company (formerly Innovative Web Applications) offers proprietary software that helps government agencies and private corporations automate how they develop policy, procedures, regulations, standards, and compliance. Innovative Web Applications was founded in 1996 in response to the overwhelming need for commercial information management tools and Web-based search and retrieval applications. An early version of the company's software, Doxcelegrity, helped the Department of Energy produce an electronic version of its infinite directives system by which orders, manuals, notices and other policy compliance articles are collaboratively developed and made available to various stakeholders. DOE continues to be a major client.

The company, located in the East Gate business park, has grown to nine employees and may need about 20 new people by the end of next year. Jim McDonald has since taken over the role of president of the company and is responsible for the direction of business operations, sales, marketing, and client services. In 2004, under its new name, Doxcelerate presented at the New Mexico Equity Capital Symposium in Albuquerque before a room of more than 100 potential investors. Doxcelerate is currently on a growth trajectory and is planning to raise funds to significantly grow the company and, most importantly, to remain in Los Alamos.

Technology Maturation Fund

The Technology Maturation Fund is a small grant program managed by the Technology Transfer (TT) Division. The fund supports Laboratory technologies perceived to have high commercial potential. Funds for the program, up to a current maximum of $450K per year, are derived from a combination of licensing/royalty revenues and monies earmarked for this purpose under Appendix M of the Laboratory's prime contract. The intent of the fund is to move promising technologies to proof-of-concept or prototype stage to attract potential licensees or investors interested in funding a startup company or commercializing a new technology. Since the program's inception in December 2002, 23 out of 46 proposals have been funded in amounts ranging from $15,000–$50,000.

To apply, Laboratory researchers submit a short proposal describing their technology and its market potential. The Technology Maturation program accepts grant applications continuously; proposals are competitively evaluated on a monthly basis. The TT Technology Maturation Panel reviews proposals. If the panel determines a proposal has significant commercial potential, the researcher is invited to compete as a finalist the next month. Awards of up to $50,000 are granted for research targeted at achieving milestones oriented toward commercialization of the technology. Preference is given to proposals for technologies that have already received an expression of interest from a commercial entity. Award decisions are based on the commercial potential of the technology, not its scientific merit.

To learn more about the Technology Maturation Fund, or to fill out an application, please visit http://www.lanl.gov/partnerships/tech_mat.html

Contact List

Outstanding innovation is the cornerstone that enables patents, copyrights, licenses, and the ensuing entrepreneurial ventures to occur. The teams cited below are key to the Laboratory's activities required to protect our intellectual property and encourage the transfer of technology to the private sector. For questions or assistance please contact any of these individuals.

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