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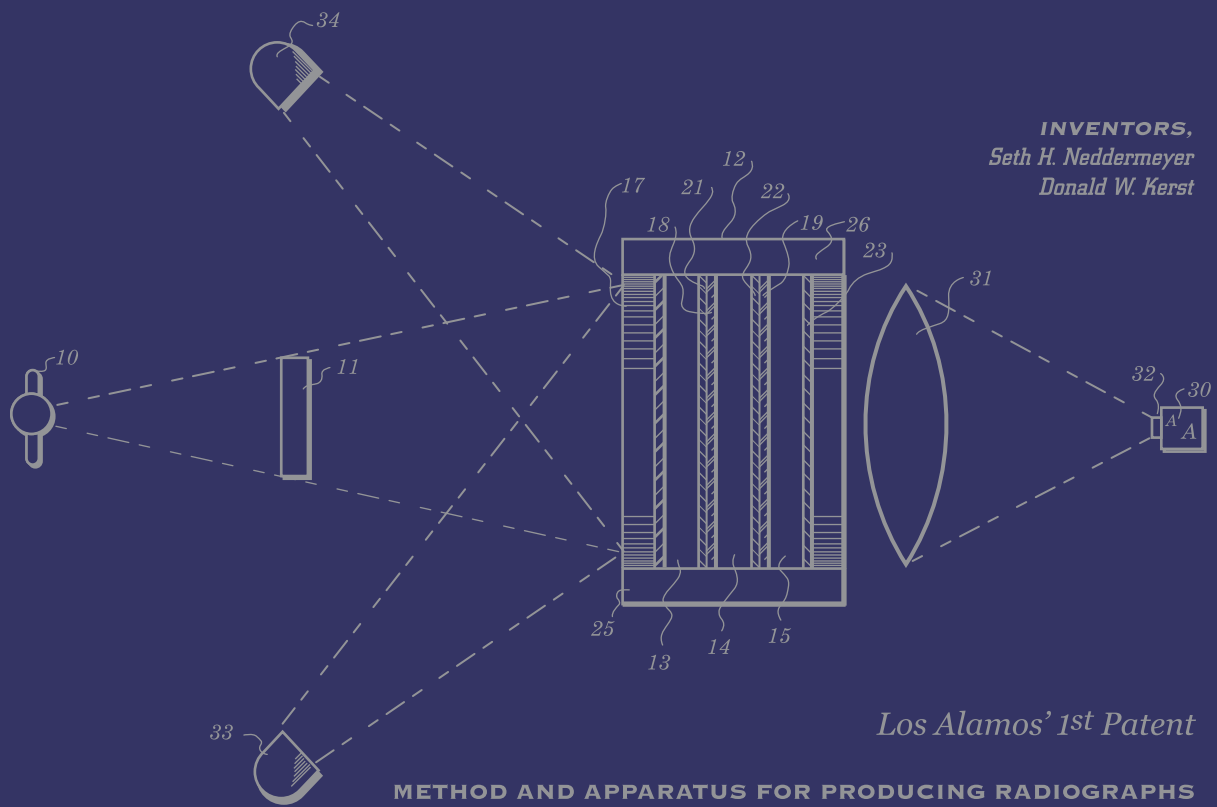


INVENTORS,
Seth H. Neddermeyer
Donald W. Kerst

Los Alamos' 1st Patent

METHOD AND APPARATUS FOR PRODUCING RADIOGRAPHS

Issued April 1947

THE 2005 PATENT & LICENSING AWARDS

Carrying on the tradition of world-changing innovation

outStanding innOvation

Applauding our innovators

The 2005 Patent & Licensing Awards

Carrying on the tradition of world-changing innovation

Thursday, February 23, 2006
Los Alamos National Laboratory
Los Alamos, New Mexico

Los Alamos
NATIONAL LABORATORY
EST. 1943

Welcome to the eighth Annual Patent and Licensing Awards Reception! We are here this evening to honor our Laboratory innovators for the impressive collection of copyrighted, patented, and licensed technologies assembled at Los Alamos. While these recognized technologies represent the broad spectrum of scientific capabilities and high level of innovation inherent in our Laboratory staff, they also represent the dedication and perseverance shown by these staff members who have chosen to actively participate in the Laboratory's technology transfer effort by protecting our intellectual assets and engaging in the commercialization process.

The Laboratory's copyrighted, patented, and licensed technologies, which derive from our mission critical work, not only bring us public recognition for our world-class science, but their commercialization also helps to strengthen the nation's economic security by enhancing U.S. industrial competitiveness. The Laboratory's reputation for excellence—earned with more than 60 years of scientific contributions to the nation—helps ensure trust in our ability to continue generating exceptional work and meeting the challenges of a rapidly changing world. The work of this evening's honorees helps the Laboratory attract new employees, program sponsors, and collaborators by expanding our interactions with industry. The crucial role our innovators play in fulfilling our Laboratory mission supports our ongoing excellence in science as well as our efforts to achieve excellence in business and operations.

On behalf of the senior management team and the entire Laboratory community, we extend our congratulations and our appreciation to this evening's honorees for their achievements and we encourage ongoing participation by all Laboratory innovators in our technology transfer activities. It is this participation with the external business community that will allow Los Alamos National Laboratory to continue to flourish in the coming decades.

Congratulations!

Robert W. Kuckuck

Robert W. Kuckuck
Laboratory Director

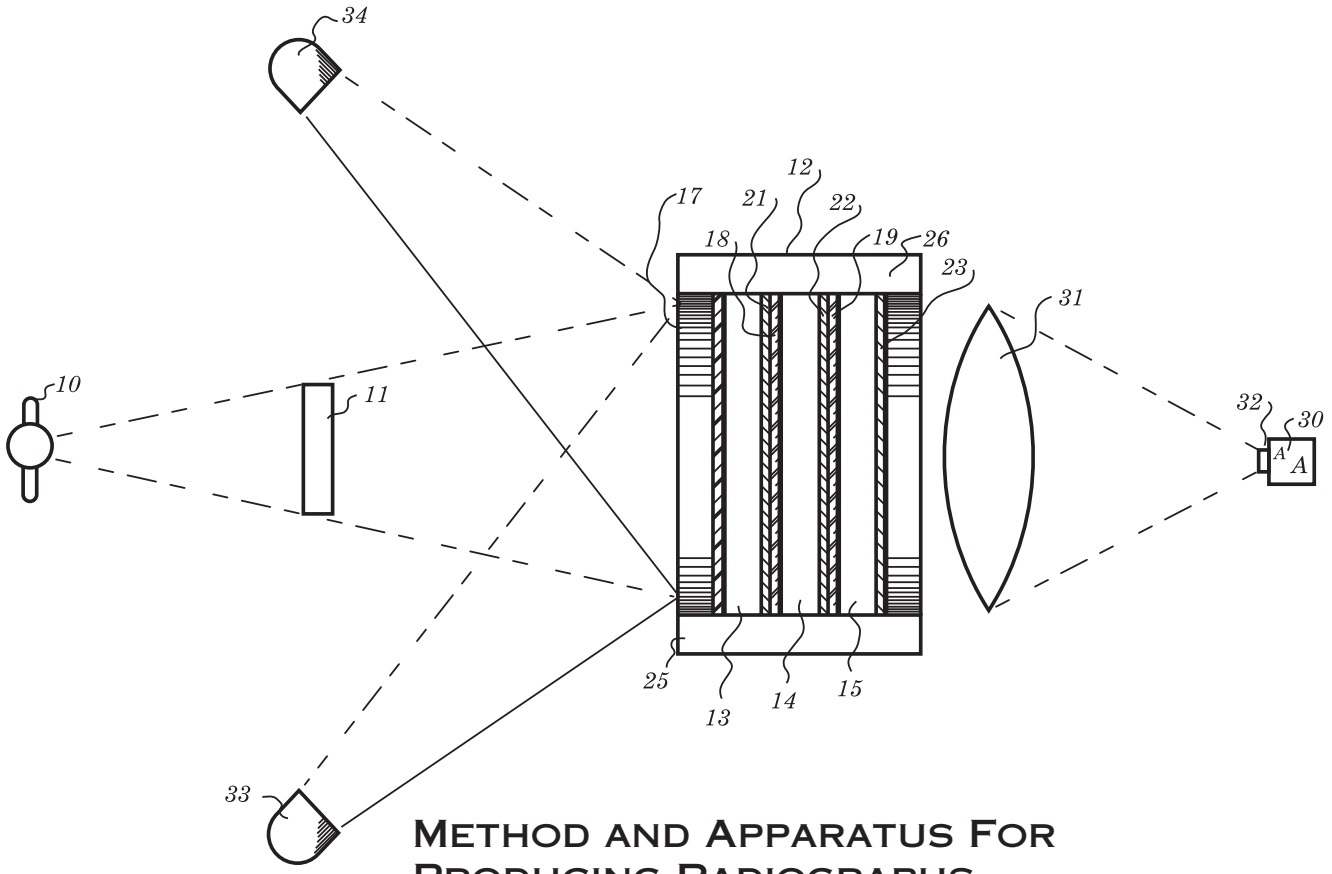
Dean Carruthers

Keynote Speaker

Dr. Garrey E. Carruthers was selected from a national pool of candidates in 2003 to head the New Mexico State University College of Business, one of six academic colleges at NMSU. He is also the current governor-appointed Chairman of the Board of the New Mexico Technology Research Collaborative. Carruthers has been president and CEO of the Cimarron Health Plan since 1993. He served as governor of New Mexico from 1987 to 1990 and was a professor in the Department of Agricultural Economics and Agricultural Business at NMSU before becoming governor.

Carruthers earned his bachelor's and master's degrees at NMSU and was awarded a Ph.D. in economics at Iowa State University in 1968. He joined the NMSU faculty in 1968. He served as assistant U.S. Secretary of the Interior from 1981 to 1984 and as special assistant to the U.S. Secretary of Agriculture in 1974–75. From 1976 to 1978, he was director of the New Mexico Water Resources Research Institute at NMSU.

Carruthers has been president of the New Mexico Association of Health Plans, a member of the New Mexico Education and Accountability Task Force, founding director of the National Center for Public Policy and Higher Education, and a founding board member of Think New Mexico. He is also a past director of the Las Cruces Chamber of Commerce and serves on the boards of the New Mexico Business Roundtable for Educational Excellence, the New Mexico Association of Commerce and Industry, and many other organizations.



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 is 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 2005 Issued Patent Recipients and License Income Recipients

Abdel-Fattah, Amar (C-INC)
Automated Video-Microscopic Imaging and Data Acquisition System for Colloid Deposition Measurements

Abney, Kent (NMT-2)
Low-Temperature Synthesis of Actinide Tetraborides by Solid-State Metathesis Reactions

Agrawal, Anoop
Electrolytes for Electro-Optic Devices Comprising Ionic Liquids

Alvarez, Marc (B-3)
* *Synthesis of [^{2}H1, ^{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 Dithanes*
* *Synthesis of Isotopically Labeled D or L [^{13}C, ^{2}H] Glycerols*
* *Synthesis of Labeled Oxalic Acid Derivatives*

Arendt, Paul (MST-STC)
Buffer Layers on Metal Alloy Substrates for Superconducting Tapes
High Temperature Superconducting Composite Conductors
Biaxially Textured Composite Substrates
Dual Ion-Beam Assisted Deposition of Biaxially Textured Template Layers
Substrate Structure for Growth of Highly Oriented and/or Epitaxial Layers Thereon
High Temperature Superconducting Thick Films

Asay, Blaine (DX-2)
Method for Monitoring the Crystallization of an Organic Compound from a Liquid
* *Lead-Free Electric Match Compositions*

Ashworth, Stephen (MST-STC)
Reduced AC Losses in HTS Coated Conductors

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

Backhaus, Scott (MST-10)
* *Traveling-Wave Device with Mass Flux Suppression*

Bai, Ying (N)
* *Master Processor Schematic 68Y-155913, Version 2.0*

Birnbaum, Eva (C-ACS)
Microporous Crystals and Synthesis Schemes

Bourret, Steven (N-1)
* *alinep, Version 1.0*
* *Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting*
* *Intelligent Shift Register – Board Schematic 68Y-155947 (ISR), Version 68155947*
* *ISR Board 68Y-155947, Version 2.0*
* *ISR Multiplicity Chip (ACTEL) , Version 4*
* *ISR Shift Register (ACTEL), Version 1*
* *ISR Shift Register (XILIN) (CTRS), Version 3*
* *ISR Shift Register (XILINX) (XXISR), Version 6*

Bowles, Jeffrey (N)
* *WIN-CTEN.EXE, Version 1*

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

Brockway, Dennis (D)
* *Graphical Input Aggregate Control (GIAC), Version 1.9*

* *License Income Recipients*

Brown, Donald (EES-11)
Canister Sealing Method and Composition for Sealing a Borehole

Brumby, Steven (ISR-2)
* *Genie Pro, Version 0.6*

Brunson, Glen (N-2)
* *WIN-CTEN.EXE, Version 1*

Burrell, Anthony (C-SIC)
Electrolytes for Electro-Optic Devices Comprising Ionic Liquids
Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method
* *Electrochromic, Salts, Solutions and Devices*
* *Electrolytes for Electro-Optic Devices Comprising Ionic Liquids*
* *Extension to MXRF IP Portfolio*
* *Fluorescent Beryllium Detection*
* *Radiofrequency Attenuator and Method*
* *Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method*

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

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

Butterfield, Kenneth (N-2)
* *NAVI-2, Version 4*

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

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

Carleton, Stewart (B)
* *Method for Rapid Base Sequencing in DNA and RNA*

Carpenter, Robert (MST-6)
Method and Apparatus for In-Process Sensing of Manufacturing Quality
Method for Brazing and Thermal Processing

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

Castro, Julio (HSR-1)
In-Situ *Leak Testing of Glovebox, Isolator, or Containment Unit Gloves*

Chavez, David (DX)
* *3,6-Bis(1H-1,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine*
* *High Nitrogen Energetic Material Based Pyrotechnic Compositions*
* *Low-Smoke Pyrotechnic Compositions*

Chen, Liaohai (B)
* *Method for Detecting Biological Agents*

Christensen, Dane (MST-6)
Method for Brazing and Thermal Processing

Coates, Don (P-DO)
* *Fuel Injector Utilizing Plasma Activation*

Cola, Mark (NMT-5)
Method and Apparatus for In-Process Sensing of Manufacturing Quality

Collins, Michael (N-1)
* *Hybrid K-Edge/X-Ray Fluorescence Densitometer (HKED), Version 3.X*

Collis, Gavin (C-SIC)
* *Fluorescent Beryllium Detection*

Cournoyer, Michael (NMT-13)
* *Chemical Software Input (CSWI)*

Currier, Robert (C-PCS)
Water Purification Using Organic Salts

Dave, Vivek (NMT-10)
Method and Apparatus for In-Process Sensing of Manufacturing Quality
Method for Brazing and Thermal Processing

Davenhall, Leisa (C-ACT)
Composition and Method for Removing Photoresist Materials from Electronic Components

Davey, John (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 Processing Software*
* *Flat Panel Amorphous Silicon High Resolution Digital Radiography*

Dearing, James (D-6)
* *Graphical Input Aggregate Control (GIAC), Version 1.9*

Dickson, Peter (DX-2)
Method for Monitoring the Crystallization of an Organic Compound from a Liquid

Duan, Yixiang (C-ACS)
Capillary-Discharge Based Handheld Detector for Chemical Vapor Monitoring

Dye, Robert (MST-7)
Meniscus Membranes for Separation

Dziewinski, Jacek (MSM-4)
* *Electrochemical Reduction of Nitrate in the Presence of an Amide*
* *Nitrate Reduction*

Edlund, Kimberly (ISR-2)
* *Genie Pro, Version 0.6*

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

Esch-Mocher, Diane (ISR-3)
* *Genie Pro, Version 0.6*

Espinoza, Brent (MST-7)
Cross Linked Polybenzimidazole Membrane for Gas Separation

Estep, Robert (N-2)
* *Combined Thermal/Epithermal Neutron (CTEN-FIT.EXE), Version 1.0*
* *WIN-CTEN.EXE, Version 1*

Feldman, William (ISR-1)
Continuous Time-of-Flight Ion Mass Spectrometer

Ferreri, Vincent (P-24)
* *Field Enhanced Electrodes for Additive Injection Non-thermal Plasma (NTP) Processor*

Fisk, Michael (CCN-5)
* *Network Topology Mapper*

Foltyn, Stephan (MST-STC)
Buffer Layers on Metal Alloy Substrates for Superconducting Tapes
High Temperature Superconducting Composite Conductors
Biaxially Textured Composite Substrates
Substrate Structure for Growth of High Oriented and/or Epitaxial Layers Thereon
High Temperature Superconducting Thick Films
Superconducting Structure

Funsten, Herbert (ISR-CSSE)
Continuous Time-of-Flight Ion Mass Spectrometer

Galassi, Mark (ISR-1)
* *Genie Pro, Version 0.6*

Garcia, Eduardo (NMT-2)
Low-Temperature Synthesis of Actinide Tetraborides by Solid-State Metathesis Reactions

Gardner, David (MST-10)
* *Pulse Tube Refrigerator with Variable Phase Shift*
* *Traveling-Wave Device with Mass Flux Suppression*

Gavrilov, Eugene (CCN-5)
* *Network Topology Mapper*

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

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

Grace, Karen (ISR-4)
Waveguide-Based Optical Chemical Sensor

Greene, Geoffrey (P-23)
* *Neutron Guide*

Groves, James (MST-STC)
Buffer Layers on Metal Alloy Substrates for Superconducting Tapes
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Biaxially Textured Composite Substrates
Dual Ion-Beam Assisted Deposition of Biaxially Textured Template Layers
Substrate Structure for Growth of High Oriented and/or Epitaxial Layers Thereon
High Temperature Superconducting Thick Films

Halbig, James (N-1)
* *Intelligent Shift Register – Board Schematic 68Y-155947 (ISR), Version 68155947*
* *ISR Board 68Y-155947, Version 2.0*
* *Master Processor Board Artwork 68Y-155913, Version 2.0*
* *Master Processor Schematic 68Y-155913, Version 2.0*
* *Master Processor Board Main XILINX Control Chip, Version 1*
* *New Low Voltage Power Supply Schematic 68Y-155924, Version 2.0*
* *Triple High Voltage Schematic 68Y-155941, Version 2.0*

Hall, Simon (C-SIC)
* *Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method*

Hamada, Michael (D-1)
System Level Analysis and Control of Manufacturing Process Variation
* *Optimizing the Availability of a Buffered Industrial Process*

Hammond, Mark (B)
* *DNA Fragment Sizing and Sorting by Laser-Induced Fluorescence*

Hansen, Walter (N-1)
* *Intelligent Shift Register–Application Board Software*
* *Intelligent Shift Register Monitor Software (ISR Monitor Software), Version 1*

Harker, William (N-1)
* *International Neutron Coincidence Counting (INCC), Version 3.0031*
* *NCCWIN (English version)*
* *Neutron Coincidence Counting for Windows (Russian version) (NCC-WIN), Version 1.3*
* *SuperHENC Neutron Coincidence Code (Super HENC), Version 1.0*

Hartman, Daniel (NMT-10)
Method and Apparatus for In-Process Sensing of Manufacturing Quality

Harvey, Neal (ISR-2)
* *Genie Pro, Version 0.6*

Havrilla, George (C-CSE)
Method and Apparatus for Detecting Chemical Binding
**Flow Method and Apparatus for Screening Chemicals Using Micro X-Ray Fluorescence*
* *Method and Apparatus for Measuring Binding Constants*
* *Method for Detecting Binding Events Using Micro-X-Ray Fluorescence Spectrometry*

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*
* *Processing Materials Inside an Atmospheric-Pressure Radiofrequency Nonthermal Plasma Discharge*

Henke, Michael (RRES-R)
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Henson, Bryan (C-PCS)
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Herrmann, Hans (P-24)
* *Atmospheric-Pressure Plasma Decontamination/Sterilization Chamber*
* *Processing Materials Inside an Atmospheric-Pressure Radiofrequency Nonthermal Plasma Discharge*

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

Hiskey, Michael (DX-2)
* *3,6-Bis(1H-1,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine*
* *High Nitrogen Energetic Material Based Pyrotechnic Compositions*
* *Lead-Free Electric Match Compositions*
* *Low-Smoke Pyrotechnic Compositions*
* *Method for Preparing Bis-(1(2) H-Tetrazol-5-YL)-Amine Monohydrate*

Holesinger, Terry (MST-6)
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Hollingsworth, Jennifer (C-PCS)
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Horley, Earl (N-1)
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Howat, Andrew (X)
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Hsu, Hsiao-Hua (P-24)
* *Neutron Dose Equivalent Meter*

Ianakiev, Kiril (N-1)
* *Low Voltage Power Supply Artwork 68Y-155924, Version .2*
* *Multi-Instrument Collect (MIC.EXE), Version 1*
* *Triple High Voltage Schematic 68Y-155941, Version 2.0*

Jett, James (B-N2)
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* *Method for Rapid Base Sequencing in DNA and RNA*

Jia, Quanxi (MST-STC)
Buffer Layer on Metal Alloy Substrates for Superconducting Tapes
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Substrate Structure for Growth of High Oriented and/or Epitaxial Layers Thereon
High Temperature Superconducting Thick Films
Superconducting Structure

John, Kevin (C-SIC)
* *Fluorescent Beryllium Detection*

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

Jorgensen, Betty (MST-7)
Cross-Linked Polybenzimidazole Membrane for Gas Separation
Meniscus Membranes for Separation

Kaduchak, Gregory (MST-11)
* *Apparatus and Method for Remote Noninvasive Characterization of Structures and Fluids inside Containers*
* *Cynlindrical Acoustic Levitator/Concentrator Having Noncircular Cross-Section*

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

Keller, Richard (B-2)
* *DNA Fragment Sizing and Sorting by Laser-Induced Fluorescence*
* *Method for Rapid Base Sequencing in DNA and RNA*

Kelly, Thomas (CCN-12)
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* *PC-FRAM Software, Version 3.3*
* *PC-FRAM Software, Version 4.3*
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Kelly, Patrick (CCS-3)
* *Quality Assessment, Restoration and oCr. (QUARC)*

Kim, Yong Ho (P-24)
* *Field Enhanced Electrodes for Additive Injection Non-thermal Plasma (NTP) Processor*

Klimov, Victor (C-PCS)
Optical Amplifiers and Lasers

Klosterbuer, Shirley (N-1)
* *FL.0, Version 2.0*
* *Intelligent Shift Register Monitor Software (ISR Monitor Software), Version 1*
* *TTYMON.0, Version 1*

Knight, Thomas
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Koscielniak, Michael (D-6)
* *Graphical Input Aggregate Control (GIAC), Version 1.9*

Krick, Merlyn (N)
* *Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting*
* *International Neutron Coincidence Counting (INCC), Version 3.0031*
* *NCCWIN (English version)*
* *Neutron Coincidence Counting for Windows (Russian version) (NCC-WIN), Version 1.3*

Kwon, Chuhee (MST-STC)
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Lamartine, Bruce (MST)
* *Depth Enhancement of Ion Sensitized Data*
* *Ultrahigh, Vacuum Focused, Ion Beam Micromill and Articles Therefrom*

Lewis, Cris (C-CSE)
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Lunsford, James (P-14)
* *Offset Stabilizer for Comparator Output*

Lupinetti, Anthony (NMT-2)
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MacArthur, Duncan (N-1)
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MacDonald, John (NMT-10)
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Mahan, Cynthia (CHS)
* *Flow Method and Apparatus for Screening Chemicals Using Micro X-Ray Fluorescence*

Mann, Grace (C-SIC)
* *Method for Detecting Binding Events Using Micro-X-Ray Fluorescence Spectrometry*

Marczak, Stanislaw (NWIS)
* *Electrochemical Reduction of Nitrate in the Presence of an Amide*
* *Nitrate Reduction*

Marrone, Babetta (B-2)
* *DNA Fragment Sizing and Sorting by Laser-Induced Fluorescence*

Martin, Richard (ESA)
* *Acoustic Cryocooler*

Martin, John (B-N2)
* *DNA Fragment Sizing and Sorting by Laser-Induced Fluorescence*
* *Method for Rapid Base Sequencing in DNA and RNA*

Martinez, Rodolfo (B-3)
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* *Synthesis of [^{2}H1, ^{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 Dithanes*
* *Synthesis of Isotopically Labeled D or L [^{13}C, ^{2}H] Glycerols*
* *Synthesis of Labeled Oxalic Acid Derivatives*

Martz, Harry (D-1)
System Level Analysis and Control of Manufacturing Process Variation
* *Optimizing the Availability of a Buffered Industrial Process*

Maas, Lynn (D-6)
* *Graphical Input Aggregate Control (GIAC), Version 1.9*

McBranch, Duncan (C-PCS)
* *Method for Detecting Biological Agents*

McCleskey, Thomas (C-SIC)
Electrolytes for Electro-Optic Devices Comprising Ionic Liquids
Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method
Microporous Crystals and Synthesis Schemes
* *Electrochromic, Salts, Solutions and Devices*
* *Electrolytes for Electro-Optic Devices Comprising Ionic Liquids*
* *Extension to MXRF IP Portfolio*
* *Fluorescent Beryllium Detection*
* *Radiofrequency Attenuator and Method*
* *Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method*

McGhee, John (CCS-4)
* *ATTILA*

Melton, Sheila (N-2)
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Menlove, Howard (N-1)
* *Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting*
* *Electrical Drawings for Super-High Efficiency Neutron Coincidence*

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Michalczyk, Ryszard (B-3)
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Migliori, Albert (MST-NHMFL)
* *Intrinsically Irreversible Heat Engine*

Mikhailovski, Alexandre (C-PCS)
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Milewski, John (MST-6)
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Miller, Thomasin (C-ACS)
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* *Flow Method and Apparatus for Screening Chemicals Using Micro X-Ray Fluorescence*

Minogue, Edel (C-SIC)
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Morris, Christopher (P-25)
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Moyzes, Robert (B)
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* *Superconductive Article Including Cerium Oxide Layer*

Murray, William (P-21)
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Naud, Darren (DX-2)
* *3,6-Bis(1H-1,2,3,4-Tetrazol-5-Ylamino)-1,2,4,5-Tetrazine*
* *Lead-Free Electric Match Compositions*
* *Low-Smoke Pyrotechnic Compositions*
* *Method for Preparing Bis-(1(2) H-Tetrazol-5-YL)- Amine Monohydrate*

Neutzler, Jay (T-DO)
* *Annular Feed Air Breathing Fuel Cell Stack*

Nolan, John (B-2)
* *DNA Base Mismatch Detection Using Flow Cytometry*
* *DNA Polymorphism Identity Determination Using Flow Cytometry*

Olivares, Jose (B-DO)
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Olsher, Richard (HSR-4)
* *Neutron Dose Equicalent Meter*
* *Proton Recoil Scintillator Neutron REM Meter*

Ott, Kevin (C-SIC)
Microporous Crystals and Synthesis Schemes

Park, Jaeyoung (P-24)
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* *DMEN.0 HC-11, version 1*
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* *Master Processor Board Artwork 68Y-155913, Version 2.0*
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Pautz, Shawn (CCS-4)
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Pelowitz, David (N-1)
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Perkins, Simon (ISR-2)
* *Genie Pro, Version 0.6*

Pesiri, David (MST-7)
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Platts, David (P-22)
Single Rotor Turbine

Porter, Reid (ISR-3)
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Prasad, Lakshman (ISR-2)
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Prime, Michael (ESA-WR)
* *System and Method for Measuring Residual Stress*

Qian, Jiang (LANSCE-12)
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Quist, Daniel (ISR-5)
* *Network Quarantine Code*
* *Network Topology Mapper*

Ramsey, John (MST-11)
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Ratliff, Robert (B)
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Reagor, William (MST-STC)
* *Underground Radio*

Reass, Pamela (N-1)
* *Low Voltage Power Supply Artwork 68Y-155924, Version .2*
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Reimus, Paul (C-INC)
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Ren, Xiaoming (MST-11)
* *Master Processor Board Artwork 68Y-155913, Version 2.0*
* *Catalyst Inks and Method of Application for Direct Methanol Fuel Cells*
* *Flow Channel Device for Electrochemical Cells*
* *Methanol Sensor Operated in Driven Mode*
* *Methanol Sensor Operated in Passive Mode*

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Robinson, Jeanne (C-PCS)
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Salazar, Steven (ISR)
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Staab, Torsten (ESA-AET)
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Taylor, Craig (C-ACT)
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* *Synthesis of [$^{2}H_{1}$, ^{13}C], [$^{2}H_{2}$, ^{13}C] and [$^{2}H_{3}$, ^{13}C] Methylaryl Sulfones and Sulfoxides*
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Uribe, Francisco (MST-11)
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Van Riper, Kenneth (X)
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Vasquez-Dom, Jose (MST-STC)
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Vo, Duc T (N)
* *New Low Voltage Power Supply Schematic 68Y-155924, Version 2.0*

Waldo, Geoffrey (B-2)
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Waring, Todd (CCS-4)
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Warner, Benjamin (C-SIC)
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Method and Apparatus for Detecting Chemical Binding
Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method
* *Electrochromic, Salts, Solutions and Devices*
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* *Flow Method and Apparatus for Screening Chemicals Using Micro X-Ray Fluorescence*

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* *Intrinsically Irreversible Heat Engine*

White, Paul (B-1)
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Young, Jennifer (MST-7)
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* *Phase and Radial Motion in Electron Linear Accelerators (PARMELA), Version 3.0*

Zawodzinski, Christine (MST-11)
* *Fuel Cell with Metal Screen Flow-Field*

Zawodzinski, Thomas (MST-11)
Fuel Cell Anode Configuration for Carbon Monoxide Tolerance

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* *Catalyst Inks and Method of Application for Direct Methanol Fuel Cells*

Zhao, Yusheng (LANSCE-1)
Diamond-Silicon Carbide Composite and Method for Preparation Thereof

Abstracts of Issued Patents

Listings are in accordance with issue dates from beginning to end of fiscal year 2005.

Reduced AC Losses in HTS Coated Conductors

Stephen P. Ashworth (MST-STC)
U.S. Patent 6,800,321

A method for reducing hysteresis losses in superconductor coated ribbons where a flux distribution is set into the superconductor coated ribbon prior to the application of alternating current.

Method for Monitoring the Crystallization of an Organic Compound from a Liquid

Blaine W. Asay (DX-2)
Bryan F. Henson (C-PCS)
Robert K. Sander (C-PCS)
Jeanne M. Robinson (C-PCS)
Steven F. Son (DX-2)
Peter Dickson (DX-2)
U.S. Patent 6,800,487

A method for monitoring the crystallization of at least one organic material from a liquid. According to the method, a liquid having at least one organic material capable of existing in at least one non-centrosymmetric phase is prepared. The liquid is interrogated with a laser beam at a chosen wavelength. As at least a portion of the organic material crystallizes from the liquid, the intensity of any light scattered by the crystallized material at a wavelength equal to one-half the chosen wavelength of the interrogating laser beam is monitored. If the intensity of this scattered light, increases, then the crystals that form include at least one non-cetrosymmetric phase.

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 6,800,591

An article including a substrate, at least one intermediate layer upon the surface of the substrate, a layer of an oriented cubic oxide material having a rock-salt-like structure upon the at least one intermediate layer, and a layer of a $SrRuO_{3p}$ 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 1.3×10^p A/cm^2 have been demonstrated with I_c's of over 200 Amperes across a sample 1 cm wide.

Waveguide-Based Optical Chemical Sensor

Karen M. Grace (ISR-4)
Basil I. Swanson (B-4)
Seppo Honkanen
(University of Arizona)
U.S. Patent 6,801,677

The invention provides an apparatus and method for highly selective and sensitive chemical sensing. Two modes of laser light are transmitted through a waveguide, refracted by a thin film host reagent coating on the waveguide, and analyzed in a phase sensitive detector for changes in effective refractive index. Sensor specificity is based on the particular species selective thin films of host reagents which are attached to the surface of the planar optical waveguide. The thin film of host reagents refracts laser light at different refractive indices according to what species are forming inclusion complexes with the host reagents.

Continuous Time-of-Flight Ion Mass Spectrometer

Herbert O. Funsten, Jr. (ISR-CSSE)
William C. Feldman (ISR-1)
U.S. Patent 6,806,467

A continuous time-of-flight mass spectrometer having an evacuated enclosure with means for generating an electric field located in the evacuated enclosure and means for injecting a sample material into the electric field. A source of continuous ionizing radiation injects ionizing radiation into the electric field to ionize atoms or molecules of the sample material, and timing means determine the time elapsed between arrival of a secondary electron out of said ionized atoms or molecules at a first predetermined location and arrival of a sample ion out of said ionized atoms or molecules at a second predetermined location.

Single Rotor Turbine

David Platts (P-22)
U.S. Patent 6,807,802

A rotor for use in turbine applications has a centrifugal compressor having axially disposed spaced apart fins forming passages and an axial turbine having hollow turbine blades interleaved with the fins and through which fluid from the centrifugal compressor flows.

Direct Methanol Fuel Cell and System

Mahlon Scott Wilson (MST-11)
U.S. Patent 6,808,838

A fuel cell having an anode and a cathode and a polymer electrolyte membrane located between anode and cathode gas diffusion backings uses a methanol vapor fuel supply. A permeable polymer electrolyte membrane having a permeability effective to sustain a carbon dioxide flux equivalent to at least 10 mA/cm^2 provides for removal of carbon dioxide produced at the anode by reaction of methanol with water. Another aspect of the present invention includes a superabsorbent polymer material placed in proximity to the anode gas diffusion backing to hold liquid methanol or liquid methanol solution without wetting the anode gas diffusion backing so that methanol vapor from the liquid methanol or liquid methanol-water solution is supplied to the membrane.

In-Situ Leak Testing of Glovebox, Isolator, or Containment Unit Gloves

Julio Marco Castro (HSR-1)
John Mark MacDonald (NMT-10)
Warren Preston Steckle, Jr. (MST-7)
U.S. Patent 6,810,715

A test plug for *in-situ* testing a glove installed in a glovebox is provided that uses a top plate and a base plate, and a diametrically expandable sealing mechanism fitting between the two plates. The sealing mechanism engages the base plate to diametrically expand when the variable distance between the top plate and the bottom plate is reduced. An inlet valve included on the top plate is used to introducing a pressurized gas to the interior of the glove, and a pressure gauge located on the top plate is used to monitor the interior glove pressure.

Optical Amplifiers and Lasers

Victor I. Klimov (C-PCS)
Alexandre A. Mikhailovski (C-PCS)
Jennifer A.Hollingsworth (C-PCS)
Moungi G. Bawendi (MIT)
Catherine A. Leatherdale (MIT)
U.S. Patent 6,819,692

An optical amplifier and laser having both broad band and wide range specific band capability based on semiconductor nanocrystal solids.

Water Purification Using Organic Salts

Robert P. Currier (C-PCS)
U.S. Patent 6,821,439

Water purification using organic salts. Feed water is mixed with at least one organic salt at a temperature sufficiently low to form organic salt hydrate crystals and brine. The crystals are separated from the brine, rinsed, and melted to form an aqueous solution of organic salt. Some of the water is removed from the aqueous organic salt solution. The purified water is collected, and the remaining more concentrated aqueous organic salt solution is reused.

Monitoring

Christopher Orr
(BNFL Instruments)
Craig Luff (BNFL Instruments)
Thomas Dockray
(BNFL Instruments)
Duncan W. MacArthur (N-1)
U.S. Patent 6,822,238

The invention provides apparatus and methods which facilitate movement of an instrument relative to an item or location being monitored and/or the item or location relative to the instrument, whilst successfully excluding extraneous ions from the detection location. Thus, ions generated by emissions from the item or location can successfully be monitored during movement. The technique employs sealing to exclude such ions, for instance, through an electro-field which attracts and discharges the ions prior to their entering the detecting location and/or using a magnetic field configured to repel the ions away from the detecting location.

Low-Temperature Synthesis of Actinide Tetraborides by Solid-State Metathesis Reactions

Anthony J. Lupinetti (NMT-2)
Kent D. Abney (NMT-2)
Eduardo Garcia (NMT-2)
U.S. Patent 6,830,738

The synthesis of actinide tetraborides including uranium tetraboride (UB_4), plutonium tetraboride (PuB_4) and thorium tetraboride (ThB_4) by a solid-state metathesis reaction are demonstrated. The present method significantly lowers the temperature required to $\leq 850^oC$. As an example, when UCl_4 is reacted with an excess of MgB_2, at 850^oC, crystalline UB_4 is formed. Powder X-ray diffraction and ICP-AES data support the reduction of UCl_3 as the initial step in the reaction. The UB_4 product is purified by washing water and drying.

Use Of Prolines for Improving Growth and Other Properties of Plants and Algae

Pat J. Unkefer (B-3)
Thomas Knight
(Digital Equipment)
Rodolfo A. Martinez (B-3)
U.S. Patent 6,831,040

Increasing the concentration of prolines, such as 2-hydroxy-5-oxoproline, in the foliar portions of plants has been shown to cause an increase in carbon dioxide fixation, growth rate, dry weight, nutritional value (amino acids), nodulation and nitrogen fixation, photosynthetically derived chemical energy, and resistance to insect pests over the same properties for wild type plants. This can be accomplished in four ways: (1) the application of a solution of the proline directly to the foliar portions of the plant by spraying these portions; (2) applying a solution of the proline to the plant roots; (3) genetically engineering the plant and screening to produce lines that overexpress glutamine synthetase in the

leaves which gives rise to increased concentration of the metabolite, 2-hydroxy-5-oxoproline (this proline is also known as 2-oxoglutaramate); and (4) impairing the glutamine synthetase activity in the plant roots which causes increased glutamine synthetase activity in the leaves which gives rise to increased concentration of 2-hydroxy-5-oxoproline. Prolines have also been found to induce similar effects in algae.

Automated Video-Microscopic Imaging and Data Acquisition System for Colloid Deposition Measurements

Amr I. Abdel-Fattah (C-INC)
Pual W. Reimus (C-INC)
U.S. Patent 6,836,559

A video microscopic visualization system and image processing and data extraction and processing method for *in situ* detailed quantification of the deposition of sub-micrometer particles onto an arbitrary surface and determination of their concentration across the bulk suspension. The extracted data includes (a) surface concentration and flux of deposited, attached and detached colloids, (b) surface concentration and flux of arriving and departing colloids, (c) distribution of colloids in the bulk suspension in the direction perpendicular to the deposition surface, and (d) spatial and temporal distributions of deposited colloids.

Piperazine-Based Nucleic Acid Analogs

Jurgen G. Schmidt (B-3)
Louis A. Silks III (B-3)
Ryszard Michalczyk (B-3)
U.S. Patent 6,841,675

A novel nucleoside analog includes a piperazine ring in the place of the ring ribose or deoxyribose sugar. Monomers utilizing a broad variety of nucleobases are disclosed, as well as oligomers comprising the monomers disclosed herein linked by a variety of linkages, including amide, phosphonamide, and sulfonamide linkages. A method of synthesizing the nucleoside analogs is also disclosed.

High Temperature Superconducting Composite Conductors

Terry G. Holesinger (MST-6)
Stephen R. Foltyn (MST-STC)
Paul N. Arendt (MST-STC)
James R. Groves (MST-STC)
Quanxi Jia (MST-STC)
Alicia Ayala (MST-STC)
U.S. Patent 6,843,898

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.

Composition and Method for Removing Photresist Materials from Electronic Components

Leisa B. Davenhall (C-ACT)
Jim Rubin (NMT-DO)
Craig M. Taylor (C-ACT)
U.S. Patent 6,846,789

A composition and method for removing photoresist materials from electronic components. The composition is a mixture of at least one dense phase fluid and at least one dense phase fluid modifier. The method includes exposing a substrate to at least one pulse of the composition in a supercritical state to remove photoresist materials from the substrate.

Electrolytes for Electrooptic Devices Comprising Ionic Liquids

Benjamin P. Warner (C-SIC)
Thomas M. McCleskey (C-SIC)
Anthony K. Burrell (C-SIC)
Anoop Agrawal
(Enki Technologies)
John Cronin
(Enki Technologies)
Juan C. L. Tonazzi
(Enki Technologies)
U.S. Patent No. 6,853,472

Electrolyte solutions of soluble bifunctional redox dyes in molten salt solvent may be used to prepare electrooptic devices with enhanced stability toward ultraviolet radiation.

The solvents include lithium or quaternary ammonium cations, and perfluorinated sulfonylimide anions selected from trifluoromethylsulfonate ($CF_3 SO_3^-$), bis(trifluoromethylsulfonyl)imide ($(CF_3 SO^2)^2 N^-$), bis(perfluoroethylsulfonyl)-imide ($(CF_3 CF_2 SO_2)_2 N^-$) and tris(triflu-oromethylsulfonyl)methide ($(CF_3 SO_2)_3 C^-$).

Method and Apparatus for In-Process Sensing of Manufacturing Quality

Daniel Hartman (NMT-10)
Vivek R. Dave (NMT-10)
George J. Cola (NMT-5)
Robert W. Carpenter II (MST-6)
U.S. Patent No. 6,857,553

A method for determining the quality of an examined weld joint comprising the steps of providing acoustical data from the examined weld joint, and performing a neural network operation on the acoustical data determine the quality of the examined weld joint produced by a friction weld process. The neural network may be trained by the steps of providing acoustical data and observable data from at least one test weld joint, and training the neural network based on the acoustical data and observable data to form a trained neural network so that the trained neural network is capable of determining the quality of a examined weld joint based on acoustical data from the examined weld joint. In addition, an apparatus having a housing, acoustical sensors mounted therein, and means for mounting the housing on a friction weld device so that the acoustical sensors do not contact the weld joint. The apparatus may sample the acoustical data necessary for the neural network to determine the quality of a weld joint.

Method and Apparatus for Detecting Chemical Binding

Benjamin P. Warner (C-SIC)
George J. Havrilla (C-ACS)
Thomasin C. Miller (C-ACS)
Cyndi A. Wells (N-3)
U.S. Patent No. 6,858,148

A method for screening binding between a target binder and potential pharmaceutical chemicals involves sending a solution (preferably an aqueous solution) of the target binder through a conduit to a size exclusion filter, the target binder being too large to pass through the size exclusion filter, and then sending a solution of one or more potential pharmaceutical chemicals (preferably an aqueous solution) through the same conduit to the size exclusion filter after target binder has collected on the filter. The potential pharmaceutical chemicals are small enough to pass through the filter. Afterwards, x-rays are sent from an x-ray source to the size exclusion filter, and if the potential pharmaceutical chemicals form a complex with the target binder, the complex produces an x-ray fluorescence signal having an intensity that indicates that a complex has formed.

Reversible Electro-Optic Device Employing Aprotic Molten Salts and Method

Benjamin P. Warner (C-SIC)
Thomas M. McCleskey (C-SIC)
Anthony K. Burrell (C-SIC)
Simon B. Hall (C-SIC)
U.S. Patent No. 6,862,125

A single-compartment reversible mirror device having a solution of aprotic molten salt, at least one soluble metal-containing species comprising metal capable of being electrodeposited, and at least one anodic compound capable of being oxidized was prepared. The aprotic molten salt is liquid at room temperature and includes lithium and/or quaternary ammonium cations, and anions selected from trifluoromethylsulfonate ($CF_3 SO_3^-$), bis(trifluoromethylsulfonyl)imide ($(CF_3 SO_2)_2 N^-$), bis(perfluoroethylsulfonyl)imide ($(CF_3 CF_2 SO_2)_2 N^-$) and tris(trifluoromethylsulfonyl)methide ($(CF_3 SO_2)_3 C^-$). A method for preparing substantially pure molten salts is also described.

Improved Direct Methanol Fuel Cell Stack

Mahlon S. Wilson (MST-11)
John C. Ramsey (MST-11)
U.S. Patent No. 6,864,004

A stack of direct methanol fuel cells exhibiting a circular footprint. A cathode and anode manifold, tie-bolt penetrations and tie-bolts are located within the circular footprint. Each fuel cell uses two graphite-based plates. One plate includes a cathode active area that is defined by serpentine channels connecting the inlet and outlet cathode manifold. The other plate includes an anode active area defined by serpentine channels connecting the inlet and outlet of the anode manifold, where the serpentine channels of the anode are orthogonal to the serpentine channels of the cathode. Located between the two plates is the fuel cell active region.

Method for Determining and Modifying Protein/ Peptide Solubility

Geoffrey S. Waldo (B-2)
U.S. Patent No. 6,867,042

A solubility reporter for measuring a protein's solubility *in vivo* or *in vitro* is described. The reporter, which can be used in a single living cell, gives a specific signal suitable for determining whether the cell bears a soluble version of the protein of interest. A pool of random mutants of an arbitrary protein, generated using error-prone in vitro recombination, may also be screened for more soluble versions using the reporter, and these versions may be recombined to yield variants having further-enhanced solubility. The method of the present invention includes "irrational" (random mutagenesis) methods, which do not require a priori knowledge of the three-dimensional structure of the protein of interest. Multiple sequences of mutation/ genetic recombination and selection for improved solubility are demonstrated to yield versions of the protein which display enhanced solubility.

Biaxially Textured Composite Substrates

James R. Groves (MST-STC)
Stephen R. Foltyn (MST-STC)
Paul N. Arendt (MST-STC)
U.S. Patent No. 6,884,527

An article including a substrate, a layer of a metal phosphate material such as an aluminum phosphate material upon the surface of the substrate, and a layer of an oriented cubic oxide material having a rock-salt-like structure upon the metal phosphate material layer is provided together with additional layers such as an HTS top layer of YBCO directly upon a layer of a buffer material such as a $SrTi_xRu_{1-x}O_3$ layer.

Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry

Dipen N. Sinha (MST-11)
U.S. Patent No. 6,889,560

An apparatus for noninvasively monitoring the flow and/or the composition of a flowing liquid using ultrasound is described. The position of the resonance peaks for a fluid excited by a swept-frequency ultrasonic signal have 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 using the apparatus and method of the present invention.

Method and Apparatus for Biological Material Separation

Donna L. Robinson (B-5)
U.S. Patent No. 6,890,740

There has been invented an apparatus comprising a separation barrier for excluding denser cell materials from less dense cell materials after centrifuging of the cells so that selected materials can be withdrawn from the less dense cell materials without inclusion of the denser cell materials or clogging of sampling equipment with denser cell materials. Cells from which selected material is to be withdrawn are centrifuged, either as cells or cells in media. Once the denser cell materials are isolated in a layer by centrifugal force, an invention screen or sieve is submerged in the less dense cell material to a level above the layer of denser cell materials to isolate the denser cell materials from the less dense cell materials, preventing mixing of the denser cell materials back into the less dense cell materials when the cells or the cells in media are no longer being centrifuged and to prevent clogging of sampling equipment with denser cell materials. In a particularly useful application of the invention method and apparatus, plasmid DNA can be withdrawn from less dense cell materials without contamination or interference with denser cell materials.

Influenza Sensor

Basil I. Swanson (B-4)
Xuedong Song (B-4)
Clifford J. Unkefer (B-3)
U.S. Patent No. 6,893,814

A sensor for the detection of tetrameric multivalent neuraminidase within a sample is disclosed, where a positive detection indicates the presence of a target virus within the sample. Also disclosed is a trifunctional composition of matter including a trifunctional linker moiety with groups bonded thereto including (a) an alkyl chain adapted for attachment to a substrate, (b) a fluorescent moiety capable of generating a fluorescent signal, and (c) a recognition moiety having a spacer group of a defined length thereon, the recognition moiety capable of binding with tetrameric multivalent neuraminidase.

Electron Radiography

Frank E. Merrill (P-25)
Christopher Morris (P-25)
U.S. Patent No.6,894,278

A system capable of performing radiography using a beam of electrons. Diffuser means receive a beam of electrons and diffuse the electrons before they enter first matching quadrupoles where the diffused electrons are focused prior to the diffused electrons entering an object. First imaging quadrupoles receive the focused diffused electrons after the focused diffused electrons have been scattered by the object for focusing the scattered electrons. Collimator means receive the scattered electrons and remove scattered electrons that have scattered to large angles. Second imaging quadrupoles receive the collimated scattered electrons and refocus the collimated scattered electrons and map the focused collimated scattered electrons to transverse locations on an image plane representative of the electrons' positions in the object.

Dual Ion-Beam Assisted Deposition of Biaxially Textured Template Layers

James R. Groves (MST-STC)
Paul N. Arendt (MST-STC)
Robert Hammond
U.S. Patent No. 6,899,928

The present invention involves a process and apparatus for epitaxial deposition of a material, e.g., a layer of magnesium oxide, onto a substrate such as a flexible metal substrate, using dual ion beams for the ion beam assisted deposition whereby thick layers can be deposited without degradation of the desired properties by the material. The ability to deposit thicker layers without loss of properties provides a significantly broader deposition window for the process.

Capillary-Discharge Based Hand-Held Detector for Chemical Vapor Monitoring

Yixiang Duan (C-ACS)
U.S. Patent No. 6,900,734

A handheld/portable detector for chemical vapor monitoring includes a housing and a discharge chamber that is established therein. The plasma discharge has a relatively small volume, e.g., in the micro-liter range. A first electrode and a second electrode are disposed within the discharge chamber and a discharge gap is established therebetween. A sample gas tube is in fluid communication with the discharge chamber and provides a sample gas to the discharge chamber. Also, a plasma gas tube is in fluid communication with the discharge chamber and provides a plasma gas thereto. Accordingly, the plasma gas can be used to maintain microplasma discharge between the electrodes and the sample gas can be introduced into the microplasma discharge. A spectrometer optically connected to the handheld/portable detector is used to measure the radiation emitted by the sample gas when subjected to the microplasma discharge.

System Level Analysis and Control of Manufacturing Process Variation

Michael S. Hamada (D-1)
Harry F. Martz, Jr. (D-1)
Jay K. Eleswarpu (P&G)
Michael J. Preissler (P&G)
U.S. Patent No. 6,901,308

A computer-implemented method is implemented for determining the variability of a manufacturing system having a plurality of subsystems. Each subsystem of the plurality of subsystems is characterized by signal factors, noise factors, control factors, and an output response, all having mean and variance values. Response models are then fitted to each subsystem to determine unknown coefficients for use in the response models that characterize the relationship between the signal factors, noise factors, control factors, and the corresponding output response having mean and variance values that are related to the signal factors, noise factors, and control factors. The response models for each subsystem are coupled to model the output of the manufacturing system as a whole. The coefficients of the fitted response models are randomly varied to propagate variances through the plurality of subsystems and values of signal factors and control factors are found to optimize the output of the manufacturing system to meet a specified criterion.

Fast Pulse Nonthermal Plasma Reactor

Louis A. Rosocha (P-24)
U. S. Patent No. 6,906,280

A fast pulsed nonthermal plasma reactor includes a discharge cell and a charging assembly electrically connected thereto. The charging assembly provides plural high voltage pulses to the discharge cell. Each pulse has a rise time between one and ten nanoseconds and a duration of three to twenty nanoseconds. The pulses create nonthermal plasma discharge within the discharge cell. Accordingly, the nonthermal plasma discharge can be used to remove pollutants from gases or break the gases into smaller molecules so that they can be more efficiently combusted.

Production of Stable, Nonthermal Atmospheric Pressure RF Capacitive Plasmas Using Gases other than Helium or Neon

Jaeyoung Park (P-24)
Ivars Henins (P-24)
U.S. Patent No. 6,909,237

The present invention enables the production of stable, steady state, non-thermal atmospheric pressure rf capacitive α-mode plasmas using gases other than helium and neon. In particular, the current invention generates and maintains stable,

steady-state, non-thermal atmospheric pressure rf α-mode plasmas using pure argon or argon with reactive gas mixtures, pure oxygen or air. By replacing rare and expensive helium with more readily available gases, this invention makes it more economical to use atmospheric pressure rf α-mode plasmas for various materials processing applications.

Canister, Sealing Method and Composition for Sealing a Borehole

Donald W. Brown (EES-11)
Arun S. Wagh
U.S. Patent No. 6,910,537

A method and composition for sealing a borehole. A chemically bonded phosphate ceramic sealant for sealing, stabilizing, or plugging boreholes is prepared by combining an oxide or hydroxide and a phosphate with water to form slurry. The slurry is introduced into the borehole where the seal, stabilization or plug is desired, and then allowed to set up to form the high strength, minimally porous sealant, which binds strongly to itself and to underground formations, steel and ceramics.

Method for Brazing and Thermal Processing

John O. Milewski (MST-6)
Vivek R. Dave (NMT-10)
Dane T. Christensen (MST-6)
Robert W. Carpenter II (MST-6)
U.S. Patent No. 6,917,010

The present invention includes a method for brazing of two objects or heat treatment of one object. First, object or objects to be treated are selected and initial conditions establishing a relative geometry and material characteristics are determined. Then, a first design of an optical system for directing heat energy onto the object or objects is determined. The initial conditions and first design of the optical system are then input into an optical ray-tracing computer program. The program is then run to produce a representative output of the heat energy input distribution to the object or objects. The geometry of the object or objects, material characteristics, and optical system design are then adjusted until a desired heat input is determined.

Substrate Structure for Growth of Highly Oriented and/or Epitaxial Layers Thereon

Paul N. Arendt (MST-STC)
Stephen R. Foltyn (MST-STC)
James R. Groves (MST-STC)
Quanxi Jia (MST-STC)
U.S. Patent No. 6,921,741

A composite substrate structure including a substrate, a layer of a crystalline metal oxide or crystalline metal oxynitride material upon the substrate, a layer of an oriented cubic oxide material having a rock-salt-like structure upon the crystalline metal oxide or crystalline metal oxynitride material layer is provided together with additional layers such as one or more layers of a buffer material upon the oriented cubic oxide material layer. J_c's of 2.3×10^6 A/cm^2 have been demonstrated with I_c's of 320 Amperes across a sample 1 cm wide for a superconducting article including a flexible polycrystalline metallic substrate, an inert oxide material layer upon the surface of the flexible polycrystalline metallic substrate, a layer of a crystalline metal oxide or crystalline metal oxynitride material upon the layer of the inert oxide material, a layer of an oriented cubic oxide material having a rock-salt-like structure upon the crystalline metal oxide or crystalline metal oxynitride material layer, a layer of a buffer material upon the oriented cubic oxide material layer, and, a top layer of a high temperature superconducting material upon the layer of a buffer material.

Borehole Sounding Device with Sealed Depth and Water Level

J.C. Kalski, Jr. (RRES-R)
Michael D. Henke (RRES-R)
U.S. Patent No. 6,923,252

A borehole device having proximal and distal ends comprises an enclosure at the proximal end for accepting an aircraft cable containing a plurality of insulated conductors from a remote position. A water sensing enclosure is attached to the enclosure and contains means for detecting water, and sending a signal on the cable to the remote position indicating water has been detected. A bottom sensing enclosure is attached to the water sensing enclosure for determining when the borehole device encounters borehole bottom and sends a signal on the cable to the remote position indicating that borehole bottom has been encountered.

Likelihood-Based Modification of Experimental Crystal Structure Electron Density Maps

Thomas C. Terwilliger (B-2)
U.S. Patent No. 6,931,329

A maximum-likelihood method for improving an electron density map of an experimental crystal structure. A likelihood of a set of structure factors $\{F_h\}$ is formed for the experimental crystal structure as (1) the likelihood of having obtained an observed set of structure factors $\{F_h^{OBS}\}$ if structure factor set $\{F_h\}$ was correct, and (2) the likelihood that an electron density map resulting from $\{F_h\}$ is consistent with selected prior knowledge about the experimental crystal structure. The set of structure factors $\{F_h\}$ is then adjusted to maximize the likelihood of $\{F_h\}$ for the experimental crystal structure. An improved electron density map is constructed with the maximized structure factors.

High Temperature Superconducting Thick Films

Paul N. Arendt (MST-STC)
Stephen R. Foltyn (MST-STC)
James R. Groves (MST-STC)
Terry G. Holesinger (MST-6)
Quanxi Jia (MST-STC)
U.S. Patent No. 6,933,065

An article including a substrate, a layer of an inert oxide material upon the surface of the substrate, (generally the inert oxide material layer has a smooth surface, i.e., a RMS roughness of less than about 2 nm), 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 is provided together with additional layers such as at least one layer of a buffer material upon the oriented cubic oxide material layer or a HTS top layer of YBCO directly upon the oriented cubic oxide material layer. With a HTS top layer of YBCO upon at least one layer of a buffer material in such an article, J_c's of 1.4×10^6 A/cm^2 have been demonstrated with projected I_c's of 210 Amperes across a sample 1 cm wide.

Method for Contour Extraction for Object Representation

Alexei N. Skourikhine (NIS-7)
Lakshman Prasad (NIS-7)
U.S. Patent No. 6,937,765

Contours are extracted for representing a pixelated object in a background pixel field. An object pixel is located that is the start of a new contour for the object and identifying that pixel as the first pixel of the new contour. A first contour point is then located on the mid-point of a transition edge of the first pixel. A tracing direction from the first contour point is determined for tracing the new contour. Contour points on mid-points of pixel transition edges are sequentially located along the tracing direction until the first contour point is again encountered to complete tracing the new contour. The new contour is then added to a list of extracted contours that represent the object. The contour extraction process associates regions and contours by labeling all the contours belonging to the same object with the same label.

Diamond Silicon Carbide Composite and Method for Preparation Thereof

Jiang Qian (LANSCE-12)
Yusheng Zhao (LANSCE-12)
U.S. Patent No. 6,939,506

Fully dense, diamond-silicon carbide composites are prepared from ball-milled microcrystalline diamond/amorphous silicon powder mixture. The ball-milled powder is sintered (P=5-8 GPa, T=1400K-2300K) to form composites having high fracture toughness. A composite made at 5 GPa/1673K had a measured fracture toughness of 12 $MPa \cdot m^{1/2}$. By contrast, liquid infiltration of silicon into diamond powder at 5 GPa/1673K produces a composite with higher hardness but lower fracture toughness. X-ray diffraction patterns and Raman spectra indicate that amorphous silicon is partially transformed into nanocrystalline silicon at 5 GPa/873K, and nanocrystalline silicon carbide forms at higher temperatures.

Particle Sizer and DNA Sequencer

Jose A. Olivares (B-DO)
Peter C. Stark (C-ACT)
U.S. Patent No. 6,942,773

An electrophoretic device separates and detects particles such as DNA fragments, proteins, and the like. The device has a capillary which is coated with a coating with a low refractive index such as Teflon® AF. A sample of particles is fluorescently labeled and injected into the capillary. The capillary is filled with an electrolyte buffer solution. An electrical field is applied across the capillary causing the particles to migrate from a first end of the capillary to a second end of the capillary. A detector light beam is then scanned along the length of the capillary to detect the location of the separated particles. The device is amenable to a high throughput system by providing additional capillaries. The device can also be used to determine the actual size of the particles and for DNA sequencing.

Superconducting Structure

Chuhee Kwon (MST-STC)
Quanxi Jia (MST-STC)
Stephen R. Foltyn (MST-STC)
U.S. Patent No. 6,943,136

A superconductive structure including a dielectric oxide substrate, a thin buffer layer of a superconducting material thereon; and, a layer of a rare earth-barium-copper oxide superconducting film thereon the thin layer of yttrium-barium-copper oxide, the rare earth selected from the group consisting of samarium, gadolinium, ytterbium, erbium, neodymium, dysprosium, holmium, lutetium, a combination of more than one element from the rare earth group and a combination of one or more elements from the rare earth group with yttrium, the buffer layer of superconducting material characterized as having chemical and structural compatibility with the dielectric oxide substrate and the rare earth-barium-copper oxide superconducting film is provided.

Cross-Linked Polybenzimidazole Membrane for Gas Separation

Betty S. Jorgensen (MST-7)
Jennifer S. Young (MST-7)
Brent F. Espinoza (MST-7)
U.S. Patent No. 6,946,015

A cross-linked, supported polybenzimidazole membrane for gas separation is prepared by layering a solution of polybenzimidazole (PBI) and α,α′dibromo-p-xylene onto a porous support and evaporating solvent. A supported membrane of cross-linked poly-2,2′-(m-phenylene)-5,5′-bibenzimidazole unexpectedly exhibits an enhanced gas permeability compared to the non-cross linked analog at temperatures over 265° C.

Meniscus Membranes for Separation

Robert C. Dye (MST-7)
Betty S. Jorgensen (MST-7)
David R. Pesiri (MST-7)
U.S. Patent 6,946,019

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.

Apparatus and Method for Handheld Sampling

Torsten A. Staab (ESA-AET)
U.S. Patent 6,947,866

The present invention includes an apparatus, and corresponding method, for taking a sample. The apparatus is built around a frame that can be held in a single hand. A sample media is used to secure the sample. A sample media adapter for securing the sample media is operated by a trigger mechanism connectively attached within the frame to the sample media adapter.

Microporous Crystals and Synthesis Schemes

William Tumas (C-SIC)
Kevin C. Ott (C-SIC)
Thomas M. McCleskey (C-SIC)
Eva R. Birnbaum (C-ACS)
U.S. Patent 6,949,238

Novel zeolites are produced by combining a polar solute, a silicon or phosphorous source, and a structure directing agent. Surfactants and a hydrophobic solvent are added to the previously mixed three species and shaken to disperse the surfactants. The reverse microemulsion is stirred overnight, at about room temperature and then iced for five to ten minutes. A metal source is added vigorously shaken for about two minutes. The mixture is then aged for about two hours at about room temperature. A

mineralizer is added and the resultant mixture aged for about two hours at about room temperature. The mixture is heated to about 180°C, for a suitable time period. The final novel product is then isolated.

Sample Desorption/ Ionization from Mesoporous Silica

Srinivas Iyer (B-4)
Andrew M. Dattelbaum (B-4)
U.S. Patent 6,958,480

Mesoporous silica is shown to be a sample holder for laser desorption/ ionization of mass spectrometry. Supported mesoporous silica was prepared by coating an ethanolic silicate solution having a removable surfactant onto a substrate to produce a self-assembled, ordered, nanocomposite silica thin film. The surfactant was chosen to provide a desired pore size between about 1 nanometer diameter and 50 nanometers diameter. Removal of the surfactant resulted in a mesoporous silica thin film on the substrate. Samples having a molecular weight below 1000, such as C_{60} and tryptophan, were adsorbed onto and into the mesoporous silica thin film sample holder and analyzed using laser desorption/ionization mass spectrometry.

Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry

Dipen N. Sinha (MST-11)
U.S. Patent 6,959,601

An apparatus for noninvasively monitoring the flow and/or the composition of a flowing liquid using ultrasound is described. The position of the resonance peaks for a fluid excited by a swept-frequency ultrasonic signal have 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 using the apparatus and method of the present invention.

Durable Electrooptic Devices Comprising Ionic Liquids

Anthony K. Burrell (C-SIC)
Benjamin P. Warner (C-SIC)
Thomas M. McCleskey (C-SIC)
U.S. Patent No. 6,961,168

Electrolyte solutions for electrochromic devices such as rear view mirrors and displays with low leakage currents are prepared using inexpensive, low conductivity conductors. Preferred electrolytes include bifunctional redox dyes and molten salt solvents with enhanced stability toward ultraviolet radiation. The solvents include lithium or quaternary ammonium cations, and perfluorinated sulfonylimide anions selected from trifluoromethylsulfonate ($CF_3SO_3^-$), bis(trifluoromethylsulfonyl)imide ($(CF_3SO_2)_2N^-$), bis(perfluoroethylsulfonyl)imide ($(CF_3CF_2SO_2)_2N^-$) and tris(trifluoromethylsulfonyl)methide ($(CF_3SO_2)_3C^-$). Electroluminescent, electrochromic and photoelectrochromic devices with nanostructured electrodes include ionic liquids with bifunctional redox dyes.

Methods of Conditioning Direct Methanol Fuel Cells

Cynthia A. Rice (MST-11)
Xiaoming Ren (MST-11)
Shimshon Gottesfeld (MST-11)
U.S. Patent No. 6,962,760

Methods for conditioning the membrane electrode assembly of a direct methanol fuel cell (DMFC) are disclosed. In a first method, an electrical current of polarity opposite to that used in a functioning direct methanol fuel cell is passed through the anode surface of the membrane electrode assembly. In a second method, methanol is supplied to an anode surface of the membrane electrode assembly, allowed to cross over the polymer electrolyte membrane of the membrane electrode assembly to a cathode surface of the membrane electrode assembly, and an electrical current of polarity opposite to that in a functioning direct methanol fuel cell is drawn through the membrane electrode assembly, wherein methanol is oxidized at the cathode surface of the membrane electrode assembly while the catalyst on the anode surface is reduced. Surface oxides on the direct methanol fuel cell anode catalyst of the membrane electrode assembly are thereby reduced.

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.

2005 Award Winner

The 2005 Distinguished Patent Award goes to the patent entitled "Reversible Electro-optic Device Employing Aprotic Molten Salts and Method," by Dr. Benjamin Warner, formerly of C-SIC division and now president and CEO of Caldera Pharmaceuticals Inc., Dr. Anthony Burrell of C-SIC, Dr. Mark McCleskey of C-SIC, and Dr. Simon Hall, a former visiting scientist from Massey University in New Zealand and now Chief Science Officer of Anzode Inc.

This patent addresses the fact that a significant portion of the U.S. energy supply is consumed by the heating and cooling of buildings and other structures. From an energy efficiency perspective, windows are the weakest point, i.e., the greatest source of energy losses. The Department of Energy estimates that optimizing heat gains and losses through windows and enhancing the use of daylight could save the United States about 5% in energy consumption each year.

Since 2001, researchers at Los Alamos have developed electro-optic technologies for managing solar heat gain through windows. Initial work developed by this team and patented at LANL focused on managing visible light using electrochromic techniques, or through the use of electrically activated dyes.

The invention described in "Reversible Electro-optic Device Employing Aprotic Molten Salts and Method" takes the management of solar heat gain one step further by managing the near infrared light that contributes about 50% of the solar heat gain. This invention uses ionic liquids—solvents with extraordinary electrochemical properties. Metal ions are dissolved into these liquids to form a window, or electroplated from solution to form a mirror. In the dissolved state, visible and near infrared light pass through, allowing the interior of a building to warm. Thus, the device would be used as a window on cold days. On warm days, the metal would be plated to form a mirror to reject excess solar heat.

Other applications of this technology include satellite heat management and the attenuation of RF signals for information security.

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.

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.

2005 Award Winners

Mike Hiskey, Darren Naud, David Chavez, and My Hang Huynh of the Dynamic Experimentation Division have developed a significant portfolio of High-Nitrogen Energetic Materials that have both commercial and programmatic applicability. These materials can be used in applications such as fireworks, explosives, and propellants. The work performed by this team is widely recognized by industry and other researchers throughout the world. Thus far, the important work performed by this research team has resulted in 17 new invention disclosures, from which 15 patent applications have been filed. The University has received nine issued patents from these patent applications; seven of these nine patents are licensed under three commercial license agreements.

The team's research and development work on High-Nitrogen Energetic Materials has resulted in several collaborative agreements with industry in support of the technology. The team has been effective in educating companies about the commercial applications for their work, which, in many cases, has laid the groundwork for attracting licensees. Each member of this team has been an active participant in the licensing and commercialization process. Their exemplary work sets a standard of excellence in support of the Laboratory's technology transfer program.

Distinguished Copyright Award

The Distinguished Copyright Award honors the authors of disclosed copyrighted materials that are considered extraordinary creations. Nominated copyrights for this distinguished award demonstrate a breadth of commercial applications, potential to create economic value, and the highest level of technical excellence. In addition, these works represent vital contributions to the Laboratory's mission and provide reciprocal benefit to the Laboratory programs under which they were developed.

Recipients of this award are true innovators in their field and advance the Laboratory's reputation in scientific excellence through their copyrighted works and software.

This year's award goes to the GENetic Imagery Exploitation (Genie) Pro software development team comprising members of the International, Space & Response Division (Groups ISR-2 and ISR-3). Genie Pro is a general purpose, interactive, adaptive tool for automatically labeling regions and finding objects in image data. Originally developed for analyzing multispectral satellite data, Genie Pro works with panchromatic (grayscale), and multispectral/hyperspectral satellite data, aerial imagery, standard color (RGB) imagery and various multi-source imagery data sets to assist analysts in rapidly identifying "features of interest."

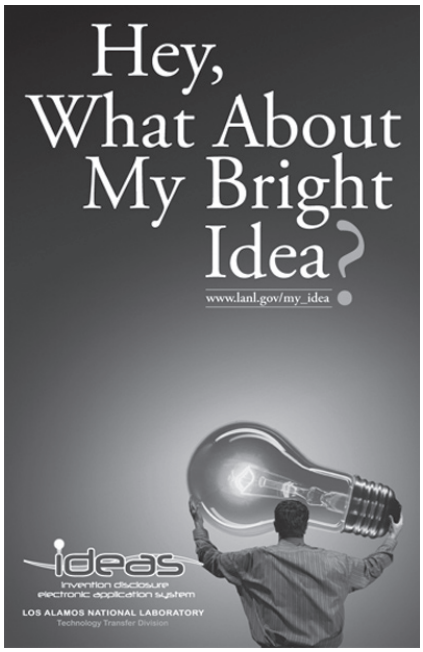
Genie Pro has the potential to allow search-and-rescue teams to quickly locate a downed aircraft lost in an immense mountain range, assist health experts by instantly identifying specific cancer cells among billions of healthy cells, augment security teams by recognizing specific faces in large crowds, or aid firefighters by distinguishing plumes of smoke from clouds of ash or precipitation. "The possibilities are pretty much endless," says Steven Brumby, a co-author of the Genie program. "Anything

that involves artificial vision could become an application."

The National Geospatial-Intelligence Agency's Geospatial Intelligence Advancement Testbed recently conducted a rigorous comparison of automatic feature extraction software. Tasks included land cover mapping; road, railroad, and drainage network mapping; broad-area searching for vehicles; and building identification. Genie Pro, won first place in this competition, with the best overall performance and very favorable user feedback.

The code is currently commercially licensed to Cambridge Research Inc. in Woburn, Massachusetts, and Research Systems Inc. in Boulder, Colorado. There are also numerous noncommercial licenses for the Genie Pro code.

The Laboratory proudly recognizes the members of the Genie Pro commercialization team:
Nancy David
Damian Eads
Chris Jeffery
Curt Novak
Kim Edlund
Mark Galassi
Simon Perkins
Diana Esch-Mosher
Steven Brumby
Neal Harvey
Reid Porter
James Theiler



IDEAS

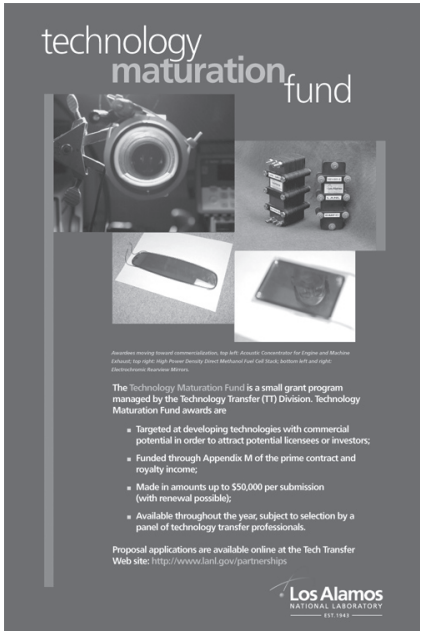
The Technology Transfer Division's IDEAS (Information Disclosure Electronic Application System) automates the first and most critical step in the technology transfer process—receiving invention disclosures from the Laboratory's research staff. This collaboration tool allows multiple users to author and edit disclosure drafts via a Web browser, helping inventors create, modify, review, and submit invention disclosures electronically.

After submission, invention disclosures are routed electronically for approvals, archiving, and entry into TT Division's Opportunity Module. Launched in November 2005, IDEAS has had an immediate impact on the disclosure process by enabling enhanced collaboration and reducing the total time required to produce high quality disclosures and expedite the approval process. The total number of invention disclosures submitted has risen dramatically since the launch of IDEAS.

In recognition of Laboratory innovators, TT Division is reinvesting a portion of its retained license income by supporting a disclosure contest. The contest, which started on January 1, 2006, will run through March 31, 2006. Laboratory innovators have the potential to receive a $25,000 award for their group as well as a $25,000 individual award for research and development in their area of expertise.

To participate in the contest, an innovator must complete and submit an on-line disclosure by midnight March 31, 2006, using IDEAS: www.lanl.gov/my_idea.

Technology Maturation Fund



The Technology Maturation Fund is a modest grant program managed by the Technology Transfer Division. The fund supports Laboratory technologies perceived to have high commercial potential. Funds for the program, up to a current maximum of $450,000 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 with the University of California. 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, 33 out of 67 proposals have been funded in amounts ranging from $15,000 to $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 www.lanl.gov/orgs/tt/tech_mat.shtml

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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Jerome Garcia, 665-4842

Intellectual Property Specialist
Christine Ramos, 665-6846

Licensing Administrator
Debbie Quintana, 665-6704

Licensing Specialist
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Technology Transfer Division
www.lanl.gov/partnerships/

Laboratory Counsel
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