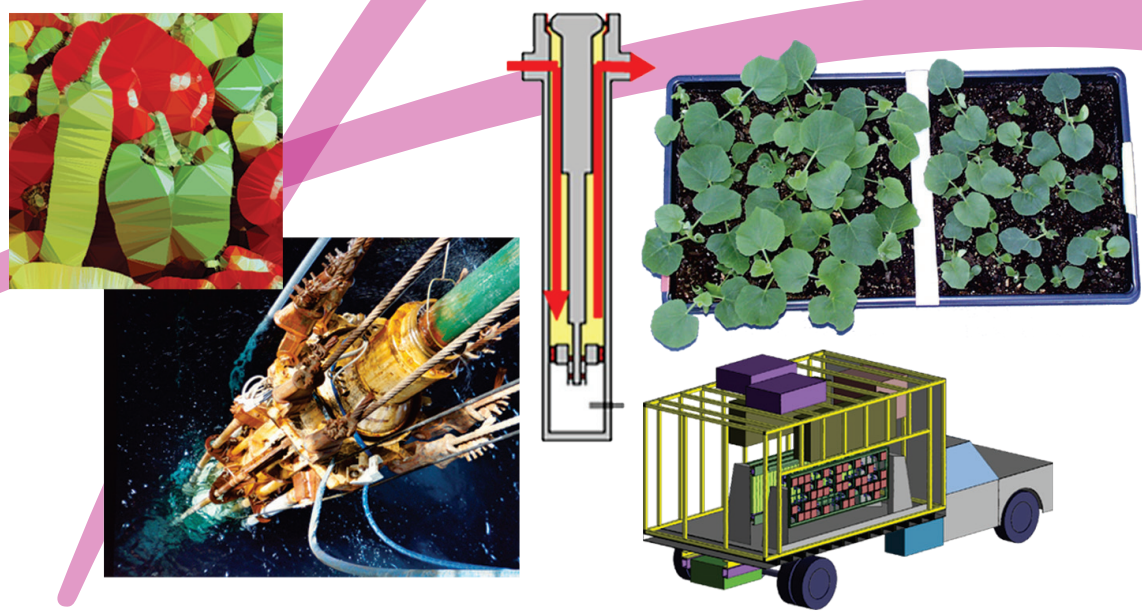
Outstanding Innovation

2009 Technology Transfer Awards



Carrying on the tradition of world-changing innovation

Los Alamos
NATIONAL LABORATORY
EST. 1943

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2009 Technology Transfer Awards

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Thursday, August 19, 2010
Los Alamos National Laboratory
Los Alamos, New Mexico

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Welcome to the 12th annual Technology Transfer Awards reception. Tonight we celebrate Los Alamos National Laboratory innovators and recognize their vital role in transferring truly game changing science and technology from the Laboratory to the private sector.

Los Alamos National Laboratory provides the United States with the best technical solutions to problems of national importance. The accomplishments of tonight's honorees, in the form of copyrighted, patented, and licensed technologies, bring recognition to the Laboratory for our world-class science. The commercialization of these technologies helps to strengthen our economic security by enhancing U.S. industrial competitiveness.

The exceptional work produced by tonight's honorees also helps the Laboratory attract the next generation of innovators, program sponsors, and collaborators by expanding our interactions with the business community. The people of Los Alamos use science and technology to meet national security challenges while at the same time fueling startup companies, creating job opportunities, and attracting business and capital to Northern New Mexico. That outcome benefits the region, the national economy, and all of society.

On behalf of Laboratory management and the Laboratory as a whole, I would like to congratulate this evening's honorees for their achievements. Continued participation by Laboratory innovators in technology transfer activities will allow Los Alamos National Laboratory to continue its vital role in regional and national economic competitiveness well into the future.

Michael R. Anastasio
Laboratory Director

Keynote Speaker: Wendolyn Holland

Senior Advisor, Commercialization and Deployment

Wendolyn Holland joined the Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) in June 2008. As Senior Advisor to the Assistant Secretary, Ms. Holland is responsible for identifying and implementing opportunities to accelerate the commercialization of efficiency and renewable energy technologies into the marketplace. In this role, she works closely with EERE program offices, national research laboratories, and private industry to increase our nation's energy security and enhance our economic prosperity.

Ms. Holland came to the Department of Energy from the private sector, having spent five years as partner or consultant to small, start-up, angel-funded firms focused on sustainability. Most recently, her endeavors have focused on sustainable water exploration and development, seamless communication infrastructure, and business continuity.

She responded to the September 11th attacks by relocating to Washington, D.C. to conduct business development and enable investor reporting compliance for a security, investigations, and counterterrorism start-up firm. Prior to that, as a strategy consultant with PricewaterhouseCoopers Consulting, her client engagements included creating the business model for State of the World Forum, Inc. to provide sustainable solutions to the problems of global development.

Ms. Holland was born in Ohio and resides in Idaho. She received her B.A. in Studies in the Environment and History of the American West from Yale University and her M.B.A. in finance and strategy from the Kellogg Graduate School of Management, Northwestern University. She is the author of Sun Valley: An Extraordinary History (1998).

Abstracts of Issued Patents

Listings are in accordance with issue dates from beginning to end of fiscal year 2009

Compositions and Methods for the Treatment of Pierce's Disease

Goutam Gupta (B-7)
U.S. Patent 7,432,419

Chimeric anti-microbial proteins, compositions, and methods for the therapeutic and prophylactic treatment of plant diseases caused by the bacterial pathogen Xylella fastidiosa are provided. The anti-microbial proteins of the invention generally comprise a surface recognition domain polypeptide, capable of binding to a bacterial membrane component, fused to a bacterial lysis domain polypeptide, and capable of affecting lysis or rupture of the bacterial membrane, typically via a fused polypeptide linker. In particular, methods and compositions for the treatment or prevention of Pierce's disease of grapevines are provided. Methods for the generation of transgenic Vitus vinefera plants expressing xylem-secreted anti-microbial chimeras are also provided.

Electrochromic Salts, Solutions, and Devices

Anthony Keiran Burrell (MPA-MC)
Benjamin Peter Warner (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,436,570

Electrochromic salts of dicationic viologens such as methyl viologen and benzyl viologen associated with anions selected from bis(trifluoromethylsulfonyl)imide, bis(perfluoroethylsulfonyl)imide, and tris(trifluoromethylsulfonyl) methide are produced by metathesis with the corresponding viologen dihalide. They are highly soluble in molten quarternary ammonium salts and, together with a suitable reductant, provide electrolyte solutions that are used in electrochromic windows.

Anion Conducting Polymer, Composition, and Membrane

Bryan Scott Pivovar (MPA-11)
David L. Thorn (C-IIAC)
U.S. Patent 7,439,275

Anion-conducing polymers and membranes with enhanced stability to aqueous alkali include a polymer backbone with attached sulfonium, phosphazenium, phosphazene, and guanidinium residues. Compositions also with enhanced stability to aqueous alkali include a support embedded with sulfonium, phosphazenium, and guanidinium salts.

Method and System for Hydrogen Evolution and Storage

Daniel Eugene Schwarz (ADSMS)
David L. Thorn (C-IIAC)
Philip Jeffrey Hay (T-1)
Thomas M. Cameron (non-LANL)
William Tumas (SPO-AE)
U.S. Patent 7,439,369

A method and system for storing and evolving hydrogen employ chemical compounds that can be hydrogenated to store hydrogen and dehydrogenated to evolve hydrogen. A catalyst lowers the energy required for storing and

evolving hydrogen. The method and system can provide hydrogen for devices that consume hydrogen as fuel.

Controlling the Pressure within an Annular Volume of a Wellbore

Robert E. Hermes (TT-DO)
U.S. Patent 7,441,599

A process is described for replacing at least a portion of the liquid within the annular volume of a casing system within a wellbore with a second liquid. The second liquid is pre-selected to provide a measure of control of the pressure within the annular volume as the fluid within the volume is being heated.

Membrane Architectures for Ion-Channel Switch-Based Electrochemical Biosensors

Annapoorna R. Sapuri/butti (non-LANL)
Antonio Redondo (T-DO)
Atul Navinchandra Parikh (MPA-CINT)
Basil Ian Swanson (C-DO)
Calvin Yang (non-LANL)
Chanel K. Yee (non-LANL)
Jose-Maria Sansinena (C-CDE)
U.S. Patent 7,442,403

A process is provided for forming a bilayer lipid membrane structure by depositing an organic layer with a defined surface area onto an electrically conductive substrate, removing portions of the organic layer upon the electrically conductive substrate. Selected portions of the organic layer are removed to form defined voids within the defined surface area of the organic layer and defined islands of organic layer upon the electrically conductive substrate. Additionally, a bilayer lipid membrane is deposited over the defined voids and defined islands of organic layer upon the substrate whereby aqueous reservoirs are formed between the electrically conductive substrate and the bilayer lipid membrane. The bilayer lipid membrane is characterized as spanning across the defined voids between the defined islands. A lipid membrane structure is also described together with an array of such lipid membrane structure.

Correlated-Intensity Velocimeter for Arbitrary Reflector (CIVAR)

Cris William Barnes (P-DO)
Shengnian Luo (P-24)
Stephen F. Paul (non-LANL)
Zhehui Wang (P-24)
U.S. Patent 7,450,222

The present invention is a velocimetry apparatus and method that splits incoming reflected laser light and directs the laser light into first and second arms. The apparatus and method filters the laser light with passband filters in the first and second arms, one having a positive passband slope and the other having a negative passband slope. The filtered laser light is then detected via light intensity detectors following the passband filters in the first and second arms.

Durable Electrooptic Devices Comprising Ionic Liquids

Anoop Agrawal (non-LANL)
Anthony Keiran Burrell (MPA-MC)
Benjamin Peter Warner (MPA-MC)
John Cronin (non-LANL)
Juan Carlos Lopez Tonazzi (non-LANL)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,450,292

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. Some of the electrolyte solutions color to red when devices employing the solutions are powered, leading to red or neutral electrooptic devices.

Electrochromic Salts, Solutions, and Devices

Anthony Keiran Burrell (MPA-MC)
Benjamin Peter Warner (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,450,293

Electrochromic salts of dicationic viologens such as methyl viologen and benzyl viologen associated with anions selected from bis(trifluoromethylsulfonyl)imide, bis(perfluoroethylsulfonyl)imide, and tris(trifluoromethylsulfonyl) methide are produced by metathesis with the corresponding viologen dihalide. They are highly soluble in molten quarternary ammonium salts and, together with a suitable reductant, provide electrolyte solutions that are used in electrochromic windows.

Analysis of Macromolecules, Ligands, and Macromolecule-Ligand Complexes

Robert Bruce Vondreele (LANSCE-LC)
U.S. Patent 7,469,036

A method for determining atomic-level structures of macromolecule-ligand complexes through high-resolution powder diffraction analysis and a method for providing suitable microcrystalline powder for diffraction analysis are provided. In one embodiment, powder diffraction data are collected from samples of polycrystalline macromolecule and macromolecule-ligand complex and the refined structure of the macromolecule is used as an approximate model for a combined Rietveld and stereochemical restraint refinement of the macromolecule-ligand complex. A difference Fourier map is calculated, and the ligand position and points of interaction between the atoms of the macromolecule and the atoms of the ligand can be deduced and visualized. A suitable polycrystalline sample of macromolecule-ligand complex can be produced by physically agitating a mixture of lyophilized macromolecule, ligand, and a solvent.

Chemical Synthesis of Chiral Conduction Polymers

Hsing-Lin Wang (C-PCS)
Wenguang Li (C-PCS)
U.S. Patent 7,476,765

A process of forming a chiral conducting polymer, e.g., polyaniline, is provided. The process includes reacting a monomer, e.g., an aniline monomer, in the presence of a chiral dopant acid to produce a first reaction mixture by addition of a solution, including a first portion of an oxidizing agent. The first portion of oxidizing agent is characterized as insufficient to allow complete reaction of the monomer. The process then involves further reacting the first reaction mixture in the presence of the chiral dopant acid by addition of a solution, including a second portion of the oxidizing agent. The second portion of oxidizing agent is characterized as insufficient to allow complete reaction of the monomer. The process then continues by repeating the reaction by adding further portions of the oxidizing agent until the monomer reaction is complete to produce a chiral conducting polymer, e.g., polyaniline. A preferred process includes addition of a catalyst during the reaction. The catalyst selected from among the group consisting of phenylene diamine, aniline oligomers, amino-capped aniline oligomers and metal salts. The processes of the present invention further provide a resultant polyaniline product having a chirality level defined by a molar ellipticity ranging from about 40×10^3 degree-cm^2/decimole to about 700×10^3 degree-cm^2/decimole. The processes of the present invention further provide a resultant polyaniline product having a nanofiber structure with a diameter from about 30 nanometers to about 120 nanometers and from about 1 micron to about 5 microns in length.

Radiofrequency Attenuator and Method

Anoop Agrawal (non-LANL)
Anthony Keiran Burrell (MPA-MC)
Benjamin Peter Warner (MPA-MC)
Simon Berners Hall (TT)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,479,843

In this radiofrequency attenuator and method, the attenuator includes a pair of transparent windows, and a chamber between the windows is filled with molten salt. Preferred molten salts include quarternary ammonium cations and fluorine-containing anions such as tetrafluoroborate (BF_4^-), hexafluorophosphate (PF_6^-), hexafluoroarsenate (AsF_6^-), trifluoromethylsulfonate ($CF_3SO_3^-$),

bis(trifluoromethylsulfonyl imide ($(CF_3SO_2)_2N^-$), bis(perfluoroethylsulfonyl imide ($(CF_3CF_2SO_2)_2N^-$) and tris(trifluoromethylsulfonyl)methide ($(CF_3SO_2)_3C^-$). Radicals or radical cations may be added to or electrochemically generated in the molten salt to enhance the radiofrequency attenuation.

Apparatus and Method for Tracking a Molecule or Particle in Three Dimensions

Guillaume Lessard (MPA-CINT)
James Henry Werner (MPA-CINT)
Peter Marvin Goodwin (MPA-CINT)
U.S. Patent 7,498,551

An apparatus and method are used to track the movement of fluorescent particles in three dimensions. Control software is used with the apparatus to implement a tracking algorithm for tracking the motion of the individual particles in glycerol/water mixtures. Monte Carlo simulations suggest that the tracking algorithms in combination with the apparatus may be used for tracking the motion of single fluorescent or fluorescently labeled biomolecules in three dimensions.

Fluorescent Temperature Sensor

Gary A. Baker (C-SIC)
Sheila Noreen Baker (C-SIC)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,497,993

The present invention is a fluorescent temperature sensor or optical thermometer. The sensor includes a solution of 1,3-bis(1-pyrenyl)propane within a 1-butyl-1-1-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide ionic liquid solvent. The 1,3-bis(1-pyrenyl)propane remains unassociated when in the ground state while in solution. When subjected to ultraviolet light, an excited state is produced that exists in equilibrium with an excimer. The position of the equilibrium between the two excited states is temperature dependent.

Primary Explosives

Michael Allen Hiskey (DE-1)
My Hang Vo Huynh (DE-1)
U.S. Patent 7,498,446

The present invention provides a compound of the formula (Cat) + z [M ++ (5-nitro-1H-tetrazolato-N_2) - x (H_2O) y] where x is 3 or 4, y is 2 or 3, x+y is 6, z is 1 or 2, and M ++ is selected from the group consisting of iron, cobalt, nickel, copper, zinc, chromium, and manganese, and (Cat) + is selected from the group consisting of ammonium, sodium, potassium, rubidium and cesium. A method of preparing the compound of that formula is also disclosed.

Kerogen Extraction from Subterranean Oil Shale Resources

Craig Michael Taylor (SPO-SC)
Marcus Oliver Wigand (C-CDE)
William Kirk Hollis (C-CDE)
U.S. Patent 7,500,517

The present invention is directed to methods for extracting a kerogen-based product from subsurface (oil) shale formations. The methods rely on fracturing and/or rubblizing portions of these formations to enhance their fluid permeability. The methods further rely on chemically modifying the shale-bound kerogen in order to render it mobile. The present invention is also directed at systems for implementing at least some of the foregoing methods. Additionally, the present invention also involves methods of fracturing and/or rubblizing subsurface shale formations and methods of chemically modifying kerogen *in situ* in order to render it mobile.

High Current Density Electropolishing in the Preparation of Highly Smooth Substrate Tapes for Coated Conductors

Lawrence Eugene Bronisz (IAT-2)
Paul Nelson Arendt (MPA-STC)
Sascha Kreiskott (MPA-STC)
Stephen R. Foltyn (MPA-STC)
Vladimir Matias (MPA-STC)
U.S. Patent 7,510,641

A continuous process is provided to form a highly smooth surface on a metallic tape by passing a metallic tape with an initial roughness through an acid bath contained within a polishing section of an electropolishing unit over a preselected period of time. The process then passes a mean surface current density of at least 0.18 amperes per square centimeter through the metallic tape during the period of time the metallic tape is in the acid bath. As such, the roughness of

the metallic tape is reduced. Such a highly smooth metallic tape can serve as a base substrate in subsequent formation of a superconductive-coated conductor.

Detection of Malicious Computer Executables

Dongming Michael Cai (ISR-3)
Maya Gokhale (CCS-1)
U.S. Patent 7,519,998

A method of detecting malicious binary executable files is accomplished by inputting a binary executable file, converting the binary executable file to byte hexadecimal text strings, calculating the frequency of each byte pattern in the byte hexadecimal text strings, selecting characteristic byte pattern frequencies as discriminating features, classifying the discriminating features as malicious or benign; labeling the binary executable file as malicious or benign, and outputting the labeled malicious or benign binary executable file.

Flow Method and Apparatus for Screening Chemicals Using Micro X-ray Fluorescence

Benjamin Peter Warner (MPA-MC)
Cris Lee Lewis (GS-PO)
Cyndi Ann Wells (IAT-1)
Cynthia Ann Mahan (C-DO)
George Joseph Havrilla (C-CDE)
Thomasin Clare Miller (C-ACS)
U.S. Patent 7,519,145

This method and apparatus screens chemicals using micro x-ray fluorescence. The method for screening a mixture of potential pharmaceutical chemicals for binding to at least one target binder involves flow-separating a solution of chemicals and target binders into separated components, exposing them to an x-ray excitation beam, detecting x-ray fluorescence signals from the components, and determining from the signals whether or not a binding event between a chemical and target binder has occurred.

Field-Enhanced Electrodes for Additive-Injection Non-Thermal Plasma (NTP) Processor

Louis Andrew Rosocha (P-24)
Vincent W Ferreri (P-24)
Yong Ho Kim (P-24)
U.S. Patent 7,521,026

The present invention comprises a field-enhanced electrode package for use in a non-thermal plasma processor. The field-enhanced electrode package includes a high voltage electrode and a field-enhancing electrode with a dielectric material layer disposed in between the high-voltage electrode and the field-enhancing electrode. The field-enhancing electrode features at least one raised section that includes at least one injection hole that allows plasma discharge streamers to occur primarily within an injected additive gas.

Methods and Apparatuses for the Development of Microstructured Nuclear Fuels

David James Devlin (MST-7)
David W. Carroll (MST-7)
Gordon Dennis Jarvinen (ADSMS)
U.S. Patent 7,521,007

Microstructured nuclear fuel adapted for nuclear power system use includes fissile material structures of micrometer-scale dimension dispersed in a matrix material. In one method of production, fissile material particles are processed in a chemical vapor deposition (CVD), fluidized-bed reactor, including a gas inlet for providing controlled gas flow into a particle coating chamber, a lower bed hot zone region to contain powder, and an upper bed region to enable powder expansion. At least one pneumatic or electric vibrator is operationally coupled to the particle coating chamber for causing vibration of the particle coater to promote uniform powder coating within the particle coater during fuel processing. An exhaust is associated with the particle coating chamber and can provide a port for placement and removal of particles and powder. During use of the fuel in a nuclear power reactor, fission products escape from the fissile material structures and come to rest in the matrix material. After a period of use in a nuclear power reactor and subsequent cooling, separation of the fissile material from the matrix containing the embedded fission products will

provide an efficient partitioning of the bulk of the fissile material from the fission products. The fissile material can be reused by incorporating it into new microstructured fuel. The fission products and matrix material can be incorporated into a waste form for disposal or processed to separate valuable components from the fission products mixture.

Nanocomposite Scintillator, Detector, and Method

Bryan L. Bennett (MST-7)
David Wayne Cooke (MST-8)
Edward Allen Mckigney (N-1)
Ross Edward Muenchausen (MST-7)
U.S. Patent 7,525,094

This compact can be used in a radiation detector for detecting ionizing radiation. The compact includes a mixture of a solid binder and at least one nanopowder phosphor chosen from yttrium oxide, yttrium tantalate, barium fluoride, cesium fluoride, bismuth germanate, zinc gallate, calcium magnesium pyrosilicate, calcium molybdate, calcium chlorovanadate, barium titanium pyrophosphate, a metal tungstate, a cerium doped nanophosphor, a bismuth doped nanophosphor, a lead doped nanophosphor, a thallium doped sodium iodide, a doped cesium iodide, a rare earth doped pyrosilicate, or a lanthanide halide.

Planar Optical Waveguide-Based Sandwich Assay Sensors and Processes for the Detection of Biological Targets, Including Early Detection of Cancers

Basil Ian Swanson (C-DO)
Jennifer Martinez (MPA-CINT)
John E. Shively (non-LANL)
Lin Li (non-LANL)
U.S. Patent 7,541,196

This invention is an assay element including recognition ligands adapted for binding to carcinoembryonic antigen (CEA) bound to a film on a single mode planar optical waveguide, the film from the group of a membrane, a polymerized bilayer membrane, and a self-assembled monolayer containing polyethylene glycol or polypropylene glycol groups therein. The patent also describes an assay process for detecting the presence of CEA, including injecting a possible CEA-containing sample into a sensor cell, including the assay element; maintaining the sample within the sensor cell for a sufficient time for binding to occur between CEA present within the sample and the recognition ligands; injecting a solution including a reporter ligand into the sensor cell; and interrogating the sample within the sensor cell with excitation light from the waveguide. The excitation light is provided by an evanescent field of the single mode penetrating into the biological target-containing sample to a distance of less than about 200 nanometers from the waveguide. It thereby excites any bound reporter ligand within a distance of less than about 200 nanometers from the waveguide and results in a detectable signal.

Planar Optical Waveguide-Based Sandwich Assay Sensors and Processes for the Detection of Biological Targets Including Early Detection of Cancers

Andrew Paul Shreve (MPA-CINT)
Basil Ian Swanson (C-DO)
Jennifer Martinez (MPA-CINT)
Karen Michelle Grace (ISR-4)
Wynne Kevin Grace (C-PCS)
U.S. Patent 7,541,197

This invention is an assay element including recognition ligands bound to a film on a single mode planar optical waveguide, the film from the group of a membrane, a polymerized bilayer membrane, and a self-assembled monolayer containing polyethylene glycol or polypropylene glycol groups therein. The patent also describes an assay process for detecting the presence of a biological target, including injecting a biological target-containing sample into a sensor cell, including the assay element, with the recognition ligands adapted for binding to selected biological targets; maintaining the sample within the sensor cell for a sufficient time for binding to occur between selected biological targets within the sample and the recognition ligands; injecting a solution including a reporter ligand into the sensor cell; and interrogating the sample within the sensor

cell with excitation light from the waveguide. The excitation light is provided by an evanescent field of the single mode penetrating into the biological target-containing sample to a distance of less than about 200 nanometers from the waveguide. It thereby excites the fluorescent-label in any bound reporter ligand within a distance of less than about 200 nanometers from the waveguide and results in a detectable signal.

Base Metal Dehydrogenation of Amine-Boranes

Johanna Marie Blacquiere (C-SIC)
Ralph T. Baker (C-IIAC)
Richard Jeffrey Keaton (C-IIAC)
U.S. Patent 7,544,837

This is a method of dehydrogenating an amine-borane having the formula R 1 H 2 NBH 2 R 2 using base metal catalyst. The method generates hydrogen and produces at least one of a [R 1 HNBHR 2] m oligomer and a [R 1 NBR 2] n oligomer. The method of dehydrogenating amine-boranes may be used to generate H_2 for portable power sources, such as, but not limited to, fuel cells.

Enhanced Pinning in Mixed Rare Earth-123 Films

Judith Louise Driscoll (MPA-STC)
Stephen R. Foltyn (MPA-STC)
U.S. Patent 7,547,661

A superconductive article and method of forming such an article is disclosed. The article includes a substrate and a layer of a rare earth barium cuprate film upon the substrate. The rare earth barium cuprate film includes two or more rare earth metals capable of yielding a superconductive composition in which ion size variance between the two or more rare earth metals is characterized as greater than zero and less than about 10×10^{-4}. And the rare earth barium cuprate film including two or more rare earth metals is further characterized as having an enhanced critical current density compared to a standard $YBa_2Cu_3O_y$ composition under identical testing conditions.

Nanocomposite Scintillator and Detector

Anthony Keiran Burrell (MPA-MC)
Bryan L. Bennett (MST-7)
David Wayne Cooke (MST-8)
Edward Allen Mckigney (N-1)
Kevin Curtis Ott (MPA-MC)
Rico Emilio Del Sesto (MPA-MC)
Ross Edward Muenchausen (MST-7)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,547,888

A nanocomposite scintillator is prepared using fast, bright, rare-earth doped nanopowder phosphor and a binder that is transparent to the emission of the phosphor.

Method of Making Metal-Polymer Composite (Method)

Piotr Zelenay (MPA-11)
Rajesh Bashyam (MPA-11)
U.S. Patent 7,550,223

A superconducting article includes a substrate having an untextured metal surface, an untextured barrier layer of $La_2Zr_2O_7$ or $Gd_2Zr_2O_7$ supported by and in contact with the surface of the substrate, a biaxially textured buffer layer supported by the untextured barrier layer, and a biaxially textured superconducting layer supported by the biaxially textured buffer layer. Moreover, a method of forming a buffer layer on a metal substrate includes the following steps: providing a substrate having an untextured metal surface, coating the surface of the substrate with a barrier layer precursor, converting the precursor to an untextured barrier layer, and depositing a biaxially textured buffer layer above and supported by the untextured barrier layer.

Chemical Solution Deposition Method of Fabricating Highly Aligned MgO Templates

Liliana Stan (MPA-STC)
Mariappan Parans Paranthaman (non-LANL)
Paul Nelson Arendt (MPA-STC)
Srivatsan Sathyamurthy (non-LANL)
Stephen R. Foltyn (MPA-STC)
Tolga Aytug (non-LANL)
U.S. Patent 7,553,799

A superconducting article includes a substrate having an untextured metal surface, an untextured barrier layer of $La_2Zr_2O_7$ or $Gd_2Zr_2O_7$ supported by and in contact with the surface of the substrate, a biaxially textured buffer layer supported by the untextured barrier layer; and a biaxially textured superconducting layer supported by the biaxially textured buffer layer. Moreover, a method of forming a buffer layer

on a metal substrate includes the following steps: providing a substrate having an untextured metal surface, coating the surface of the substrate with a barrier layer precursor; converting the precursor to an untextured barrier layer, and depositing a biaxially textured buffer layer above and supported by the untextured barrier layer.

Gold-Coated Nanoparticles for Use in Biotechnology Applications

Douglas Eugene Berning (IAT-1)
Jurgen G. Schmidt (B-7)
Robert Henry Kraus (LDRD-PO)
Robert Whitehill Atcher (SPO-SC)
U.S. Patent 7,556,863

This invention describes a process of preparing gold-coated magnetic nanoparticles and includes forming a suspension of magnetic nanoparticles within a suitable liquid, adding an amount of a reducible gold compound and a reducing agent to the suspension, and maintaining the suspension for a sufficient enough time to form gold-coated magnetic nanoparticles.

Permeable Polyaniline Articles for Gas Separation

Benjamin Russell Mattes (C-PCS)
Hsing-Lin Wang (C-PCS)
U.S. Patent 7,563,484

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.

Fluorscent Temperature Sensor

Gary A. Baker (C-SIC)
Sheila Noreen Baker (C-SIC)
Thomas Mark McCleskey (MPA-MC)
U.S. Patent 7,566,569

The present invention relates to a method for measuring a surface temperature using a fluorescent temperature sensor or optical thermometer. The sensor includes a solution of 1,3-bis(1-pyrenyl)propane within a 1-butyl-1-1-methyl pyrrolidinium bis(trifluoromethylsulfonyl)imide ionic liquid solvent. The 1,3-bis(1-pyrenyl)propane remains unassociated when in the ground state while in solution. When subjected to ultraviolet light, an excited state is produced that exists in equilibrium with an excimer. The position of the equilibrium between the two excited states is temperature dependent.

Airborne Particulate Discriminator

Alonso Castro (C-CDE)
Kathryn Louise Creek (B-7)
Perry Clayton Gray (GS-PO)
U.S. Patent 7,573,571

Method and apparatus for rapid and accurate detection and discrimination of biological, radiological, and chemical particles in air is provided. A suspect aerosol of the target particulates is treated with a taggant aerosol of ultrafine particulates. Coagulation of the taggant and target particles causes a change in fluorescent properties of the cloud, providing an indication of the presence of the target.

Direct Imaging of Neural Currents Using Ultra-Low Field Magnetic Resonance Techniques

Andrei Nikolaevich Matlashov (P-21)
John Compton Mosher (P-21)
Michelle A. Espy (P-21)
Petr Lvovich Volegov (P-21)
Robert Henry Kraus (LDRD-PO)
U.S. Patent 7,573,268

Using resonant interactions to directly and tomographically image neural activity in the human brain with magnetic resonance imaging (MRI) techniques at ultra-low field (ULF), the present inventors have established an approach that is sensitive to magnetic field distributions local to the spin population in cortex at the Larmor frequency of the measurement field. Because the Larmor frequency can be

readily manipulated (through varying B m), one can also envision using ULF-DNI to image the frequency distribution of the local fields in cortex. Such information, taken together with simultaneous acquisition of MEG and ULF-NMR signals, enables non-invasive exploration of the correlation between local fields induced by neural activity in cortex and more distant measures of brain activity such as MEG and EEG.

Method of Improving Fuel Cell Performance

Jong-Ho Choi (MPA-11)
Piotr Zelenay (MPA-11)
Yu Seung Kim (MPA-11)
U.S. Patent 7,575,824

This invention describes a method of removing contaminants from a fuel cell catalyst electrode. The method includes providing a getter electrode and a fuel cell catalyst electrode having at least one contaminant to a bath and applying a voltage sufficient to drive the contaminant from the fuel cell catalyst electrode to the getter electrode. Methods of removing contaminants from a membrane electrode assembly of a fuel cell and of improving performance of a fuel cell are also provided.

Structure-Based Receptor Mimics Targeted against Bacterial Superantigent Toxins

Elizabeth Hong-geller (non-LANL)
Goutam Gupta (B-7)
Nancy M. Lehnert (non-LANL)
Patrick Robert Shiflett (B-8)
U.S. Patent 7,576,183

The invention provides therapeutic compositions useful in the treatment of bacterial superantigen mediated conditions, such as Toxic Shock Syndrome. The compositions comprise genetically engineered bifunctional polypeptides containing a specific T-cell receptor binding domain and a specific MHC class II receptor binding domain, each targeting non-overlapping epitopes on a super-antigen molecule against which they are designed. The anti-super-antigen receptor mimetics or chimeras are rationally designed to recreate the modality of super-antigen binding directly to both the TCR and the MHC-II receptor and are capable of acting as decoys for super-antigen binding, effectively out-competing the host T-cell and MHC-II receptors, the natural host receptors.

Tape-Cast Sensors and Method of Making

Eric Lanich Brosha (MPA-11)
Fernando Henry Garzon (MPA-11)
Rangachary Mukundan (MPA-11)
U.S. Patent 7,575,709

The invention provides a method of making electrochemical sensors in which an electrolyte material is cast into a tape. Prefabricated electrodes are then partially embedded between two wet layers of the electrolyte tape to form a green sensor, and the green sensor is then heated to sinter the electrolyte tape around the electrodes. The resulting sensors can be used in applications such as, but not limited to, combustion control, environmental monitoring, and explosive detection. An electrochemical sensor formed by the tape-casting method is also disclosed.

Anion-Conducting Polymer, Composition, and Membrane

David L. Thorn (C-IIAC)
Bryan Scott Pivovar (MPA-11)
U.S. Patent 7,582,683

Anion-conducing polymers and membranes with enhanced stability to aqueous alkali include a polymer backbone with attached sulfonium, phosphazenium, phosphazene, and guanidinium residues. Compositions also with enhanced stability to aqueous alkali include a support embedded with sulfonium, phosphazenium, and guanidinium salts.

Low Temperature Route to Uranium Nitride

Alfred Peter Sattelberger (C-DO)
Anthony Keiran Burrell (MPA-MC)
Charles Yeamans (non-LANL)
Gary Cerifice (non-LANL)
Ken Czerwinski (non-LANL)
Thomas Hartmann (non-LANL)
U.S. Patent 7,582,232

A method of preparing an actinide nitride fuel for nuclear reactors is provided. The method comprises the following steps: a) providing at least one actinide oxide and optionally zirconium oxide, b) mixing the oxide with a source of

hydrogen fluoride for a period of time and at a temperature sufficient to convert the oxide to a fluoride salt; c) heating the fluoride salt to remove water; d) heating the fluoride salt in a nitrogen atmosphere for a period of time and at a temperature sufficient to convert the fluorides to nitrides; and e) heating the nitrides under vacuum and/or inert atmosphere for a period of time sufficient to convert the nitrides to mononitrides.

Portable Multiplicity Counter

David C. Jones (N-1)
Matthew R. Newell (N-1)
U.S. Patent 7,583,776

A portable multiplicity counter has signal input circuitry, processing circuitry and a user/computer interface disposed in a housing. The processing circuitry—which can comprise a microcontroller integrated circuit operably coupled to shift register circuitry implemented in a field programmable gate array—is configured to be operable via the user/computer interface to count input signal pluses receivable at the signal input circuitry and record time correlations thereof in a total counting mode, coincidence counting mode, and/or a multiplicity counting mode. The user/computer interface can be, for example, an LCD display/keypad and/or a USB interface. The counter can include a battery pack for powering the counter and low/high voltage power supplies for biasing external detectors so that the counter can be configured as a hand-held device for counting neutron events.

Preparation of Carbon Nanoparticles and Carbon Nitride from High Nitrogen Compound

Michael Allen Hiskey (DE-1)
My Hang Vo Huynh (DE-1)
U.S. Patent 7,582,273

The high-nitrogen compound 3,6-di(azido)-1,2,4,5-tetrazine (DiAT) was synthesized by a relatively simple method and used as a precursor for the preparation of carbon nanospheres and nanopolygons and nitrogen-rich carbon nitrides.

Synthesis of [1-13C] Pyruvic Acid, [2-13C] Pyruvic Acid, [3-13C] Pyruvic Acid, and Combinations Thereof

Clifford Jay Unkefer (B-8)
Marc Anthony Alvarez (B-8)
Rodolfo Antonio Martinez (B-8)

The present invention is directed to labeled compounds, of the formulae [Image Omitted] embedded image chem tif wherein C* is each independently selected from the group consisting of 13 C and 12 C, with the proviso that at least one C* is 13 C; each hydrogen of the methylene group can independently be either hydrogen or deuterium; the methyl group includes either zero or three deuterium atoms; Q is from the group of sulfide, sulfinyl, and sulfone, Z is an aryl group from the group of 1-naphthyl, substituted 1-naphthyl, 2-naphthyl, substituted 2-naphthyl, and phenyl groups with the structure [Image Omitted] wherein R 1 , R 2 , R 3 , R 4 and R 5 are each independently from the group of hydrogen, a C 1 -C 4 lower alkyl, a halogen, and an amino group from the group of NH 2; NHR and NRR' where R and R' are each independently from the group of a C 1 -C 4 lower alkyl, a phenyl, and an alkoxy group; and the methyl group can include either zero or three deuterium atoms.

Protein Subcellular Localization Assays using Split Fluorescent Proteins

Geoffrey S. Waldo (B-9)
Stephanie Cabantous (B-9)
U.S. Patent 7,585,636

The invention provides protein subcellular localization assays using split fluorescent protein systems. The assays are conducted in living cells, do not require fixation and washing steps inherent in existing immunostaining and related techniques, and permit rapid, non-invasive, direct visualization of protein localization in living cells. The split fluorescent protein systems used in the practice of the invention generally comprise two or more self-complementing fragments of a fluorescent protein, such as GFP, wherein one or more of the fragments correspond to one or more beta-strand microdomains and are used to tag proteins of interest, and a complementary assay fragment of the fluorescent protein. Either or both of the fragments may be functionalized with a subcell–ular targeting sequence enabling it to be expressed in or directed to a particular subcellular compartment (i.e., the nucleus).

Chalogen Catalysts for Polymer Electrolye Fuel Cell

Andrzej Wieckowski (non-LANL)
Dianxue Cao (non-LANL)
Jong-Ho Choi (MPA-11)
Nicolas Alonso-vante (non-LANL)
Piotr Zelenay (MPA-11)
U.S. Patent 7,588,857

This invention describes a methanol-tolerant cathode catalyst and a membrane electrode assembly for fuel cells that include such a cathode catalyst. The cathode catalyst includes a support having at least one transition metal in elemental form and a chalcogen disposed on the support. Methods of making the cathode catalyst and membrane electrode assembly are also described.

Composite Materials and Method of Making

Fernando Henry Garzon (MPA-11)
Francisco A. Uribe (MPA-11)
Mahlon Scott Wilson (MPA-11)
U.S. Patent 7,589,047

A method of depositing noble metals on a metal hexaboride support is provided. The hexaboride support is sufficiently electropositive to allow noble metals to deposit spontaneously from solutions containing ionic species of such metals onto the support. The method permits the deposition of metallic films of controlled thickness and particle size at room temperature without using separate reducing agents. Composite materials comprising noble metal films deposited on such metal hexaborides are also described. Such composite materials may be used as catalysts, thermionic emitters, electrical contacts, electrodes, adhesion layers, and optical coatings.

Method for Implantation of High Dopant Concentrations in Wide Band Gap Materials

Igor Olegovich Usov (MST-8)
Paul Nelson Arendt (MPA-STC)
U.S. Patent 7,589,004

A method that combines alternate low/medium ion dose implantation with rapid thermal annealing at relatively low temperatures. At least one dopant is implanted in one of a single crystal and an epitaxial film of the wide band gap compound by a plurality of implantation cycles. The number of implantation cycles is sufficient to implant a predetermined concentration of the dopant in one of the single crystal and the epitaxial film. Each of the implantation cycles includes the steps of: implanting a portion of the predetermined concentration of the one dopant in one of the single crystal and the epitaxial film; annealing one of the single crystal and the epitaxial film and implanted portion at a predetermined temperature for a predetermined time to repair damage to one of the single crystal and the epitaxial film caused by implantation and activates the implanted dopant; and cooling the annealed single crystal and implanted portion to a temperature of less than about 100.degree. C. This combination produces high concentrations of dopants, while minimizing the defect concentration.

Explosive Complexes

My Hang Vo Huynh (DE-1)
U.S. Patent 7,592,462

Lead-free primary explosives of the formula [M II (A) R (B X) S] (C Y) T , where A is 1,5-diaminotetrazole and syntheses thereof are described. Substantially stoichiometric equivalents of the reactants lead to high yields of pure compositions, thereby avoiding dangerous purification steps.

Preparation of Tungsten Oxide

Betty S. Jorgensen (DE-3)
Christopher J. Bulian (non-LANL)
Robert Craig Dye (TT-DO)
Steven Forrest Son (DE-6)
William L. Perry (DE-6)
U.S. Patent 7,591,984

Tungsten trioxide hydrate (WO_3H_2O) was prepared from a precursor solution of ammonium paratungstate in concentrated aqueous hydrochloric acid. The precursor solution was rapidly added to water, resulting in the crash precipitation of a yellow white powder identified as WO_3H_2O nanosized platelets by x-ray diffraction and scanning electron microscopy. Annealing of the powder at 200° C. provided cubic phase WO_3 nanopowder, and at 400° C. provided WO_3 nanopowder as a mixture of monoclinic and orthorhombic phases.

Segmented Superconducting Tape Having Reduced AC Losses and Method of Making

Haiyan Wang (MPA-STC)
Paul Nelson Arendt (MPA-STC)
Quanxi Jia (MPA-CINT)
Stephen R. Foltyn (MPA-STC)
Terry George Holesinger (MPA-STC)
U.S. Patent 7,593,758

This invention provides a superconducting tape having reduced AC losses. The tape has a high temperature superconductor layer that is segmented. Disruptive strips, formed in one of the tape substrate, a buffer layer, and the superconducting layer create parallel discontinuities in the superconducting layer that separate the current-carrying elements of the superconducting layer into strips or filament-like structures. Segmentation of the current-carrying elements has the effect of reducing AC current losses. Methods of making such a superconducting tape and reducing AC losses in such tapes are also disclosed.

Copyrights Asserted in Fiscal Year 2009

Sturm Library, Version 1.0

Anna Matsekh (ISR-2)

Sturm Library is a collection of C-models that allows for the computation of eigen values and eigen vectors of sparse, tri-diagonal, and dense real symmetric matrices, as well as singular values and singular vectors of sparse, bi-diagonal, and dense real un-symmetric matrices with guaranteed accuracy.

GROMIT, Version 3.0

Richard Klamann (CCS-6)

The Graphical Representation/Ontological Model Inference Tool (GROMIT) is a software tool for qualitative modeling of very large, phased systems. Systems are characterized by multi-parent, hierarchical lists of components, coupled with an arbitrary number of graphical stories reflecting component relationships over various activities or phases of system operation.

Mimetic Finite Differences (MFD3D), Version 0.2

Konstantin Lipnikov (T-5)

MFD3D solves a diffusion problem with full tensor coefficients on unstructured polyhedral meshes. The solution is computed at centers of mesh elements. The mimetic finite difference method is used to discretize the problem.

LANL-Trace, Version 1.0

John Bent (HPC-5)

LANL-Trace creates a record of the I/O performed by a parallel application. This code uses perl and ltrace to attach to the processes in a parallel application and collect a record of their I/O.

RadNet Listener, Version 1.0

Kirk Thompson (SAE-2)

The RadNet Listener package provides a Java-based listener and support classes that procures and decodes RadNet messages from the network transport layer into their instrument-specific datasets and makes those dataset members available to consumer software as indexed name-value pairs.

Real-time Accessible Data Networking (RadNet) is a standard method of instrumentation for transmitting their data and status across the Internet/intranet. The purpose of RadNet is to provide a common mechanism for integration and management of data from disparate instrumentation manufacturers and instrument types.

The RadNet protocol is split into three functional areas: the header, body, and footer. The intent of this format is to provide the most basic information first, in a simple and consistent manner. The header format is the same for all instruments and contains basic information about the instrument such as its location, type, status, and address. Detailed information specific to an

instrument's settings and readings is contained in the message body.

Particle Pipes, Version 1.0

Marko Rodriguez (T-5)

The connectivity and availability of the Internet enables truly grassroots networks to disseminate news at the personal level. In such an environment where news abounds and anyone can publish and distribute, a method is needed to filter the overwhelming quantity of information to locate news items that are relevant to the individual. Currently, search engines are the primary method used to locate online information, but they require a centralized database for querying and they assume that searchers can specify their interests a priori. Traditional news media such as radio and television disseminate news to a generalized audience. These media fail to cater to an individual's particular interests and do not offer a wide variety of sources. This software presents an algorithm that employs a social network as an alternative means of news media distribution. A "word-of-mouth" social network can be used to augment an individual's news-gathering capability by both locating more news than individuals could by themselves and filtering the news to supply only those items that are relevant to an individual. This method is a veritable news revolution in such that what constitutes news and its audience is dynamically and organically determined as individuals participate in the system.

Adaptive Algorithms for Image Restoration (AAIR), Version 0.01

Brendt Wohlberg (T-5)

This Matlab library provides functions for the development of adaptive algorithms (primarily exemplar-based) for image restoration problems, such as denoising, deconvolution, superresolution, and inpainting. The image restoration approach is based on concept of projections into the manifold of clean data.

PARTISN, Version 5.71

Randy Baker (CCS-2)
Ray Alcouffe (CCS-2)
Scott A. Turner (CCS-2)
Jon Dahl (CCS-2)
Robert Ward (XCP-1)

PARTISN solves the linear Boltzmann transport equation for neutral particles using the deterministic (SN) method. Both the static (fixed source or Eigen value) and time-dependent forms of the transport equation are solved in forward or adjoint mode. PARTISN also solves the static (Probability of Initiation) and time-dependent stochastic neutron transport equations. Vacuum, reflective, periodic, white, rotational, or inhomogeneous boundary conditions are solved. General anisotropic scattering and inhomogeneous sources are permitted. PARTISN solves the transport equation on orthogonal (single-level or block-structured AMR) grids in 1-D geometries.

ORCAS DSP, Version 2.0

Mark Naivar (B-9)

This Digital Signal Processor (DSP) firmware runs on a commercial embedded DSP board (ORSYS C6211CPU) for use in flow cytometry. The firmware is written in C++ and uses no operating system or task scheduling software. The firmware is responsible for collecting captured waveforms from one or more commercial electronic boards (ORSYS ORS-114), processing the data into list mode parameters using a flexible multi-pass processing algorithm, and sending the processed results to a host computer over the IEEE 1394 (FireWire) interface. Parts of the code are highly optimized because the performance directly impacts the maximum throughput of the system. The code also implements the communication protocol for the host to send commands and get status from the DSP board. Changes in version 2.0 include the support of commercial hardware and the ability to perform multi-pass processing algorithms on the captured waveforms. The system is relatively cheap to build and is scalable and flexible so it can handle a wide range of instruments. The software requires data acquisition hardware to capture and buffer the signals from the detectors.

LANL Plotting Library

John St. Ledger (D-3)
Dmitry Keselman (D-3)

The LANL Plot library facilitates the development of Java applications that require data plotting capability. The interfaces allow the developer to produce from his application a graph of data in a separate frame. The frame then allows the user certain capabilities to manipulate, save, and print the graph without additional work from the application's programmer.

LANL Checkpointing Research Tool

John Bent (HPC-5)
James A. Nunez (HPC-5)
Gary Grider (HPC-DO)

The LANL Checkpointing Research Tool is a software tool designed to help researchers understand, explore, and analyze the unique patterns of IO within the checkpoint dumps of highly parallel applications run on LANL supercomputers.

Diamond II, Version 3.0

Chuck Farrar (Inst. Off.)
Hoon Sohn (Inst. Off.)
David W. Allen (WT-2)

This software is a collection of data interrogation algorithms and a graphical interface for the development of structural health monitoring solutions. DIAMOND II (Version 3.0) runs on the MATLAB software package, and this software is an extension of DIAMOND (LA-CC-98-12, Version 1.0) and DIAMOND II (LA-CC-01-69, Version 2.0). Users select various components from the provided data interrogation routines and construct their own application-specific structural health monitoring processes tailored for their specific structure using the graphical interface software. The assembled structural health monitoring process is able to (1) autonomously decide whether or not a system has defects and (2) locate the region of damage.

SC09 Demo, Version 0.9

Benjamin Bergen (CCS-7)
Marcus Daniels (CCS-7)

This is a development code for experimental computer science research. It implements a Godunov-based, gamma-law equation-of-state, compressible gas dynamics simulation code for two-dimensional structured grids. The code employs a Monotone Upstream-centered Scheme for Conservation Laws (MUSCL) method and the Hancock predictor-corrector time evolution scheme. The code is distributed-memory parallel using the Message Passing Interface (MPI) and is data-parallel using the Open Computing Language (OpenCL) framework for accelerated computing architectures. There are currently no relevant publications for this code.

Adaptive Software Radio

Michael Caffrey (ISR-3)
Joseph Palmer (ISR-3)

The Adaptive Software Radio is an algorithm/waveform definition for exploiting a dynamic communications channel with an adaptive radio. The method depends on the receiver monitoring the SNR of the signal and commanding the transmitter to the maximum bit rate that can be supported under current conditions. One use is in low earth orbit satellite downlinks that exhibit wide variations. A conventional uplink is used to vary the rate on the satellite transmitter and implement an adaptive communication system. This algorithm increases the total amount of data that can be transmitted through the channel.

Fiscal Year 2009 License Income Recipients

Anderson, Aaron S.
Field Deployable Device for Pathogen Detection

Arendt, Paul Nelson
Superconductivity Technology
CNT Portfolio for Structural Applications
Aligned Crystalline Silicon

Audia, Jeffrey M.
MiniGRAND Family of Instruments

Bai, Ying
Advanced Multiplicity Shift Register (AMSR)
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Barbe, Michael R.
Laser Production of Articles from Powders (Directed Light Fabrication)

Bollen, Johan Lambert Trudo Maria
Blackbox Version 1.0

Borozdin, Konstantin N.
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Bott, Terrence F.
LED Tree v.1.0

Bourret, Steven C.
Advanced Multiplicity Shift Register (AMSR)
MiniGRAND Family of Instruments
Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting for Use with Super-HENC

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Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1.0

Bradbury, Andrew M.
Anti-Sulfotyrosine Antibodies
Plasmids and Bacterialphage Packaging Cell Line for Phage Display
Self Assembling Split Fluorescent Protein System (Los Alamos Green Florescent Protein Portfolio)
LANL GFP Portfolio

Bradley, Jonathan N.
MultiResolution Seamless Image Compression Invention and Software (MRSID)

Bronisz, Lawrence Eugene
Superconductivity Technology

Brown, Donald Weber
Down Hole Sealing Method (Ceramicrete)
Geothermal Energy Production with Supercritical Fluids

Brumby, Steven Patrick
Genie Pro, Version 2.0

Brunson, Jr., Glenn S.,
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Burrell, Anthony Keiran
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Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample
Polymer-Assisted Deposition of Metal Oxides and Nitrides

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Cabantous, Stephanie
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Self Assembling Split Fluorescent Protein System (Los Alamos Green Florescent Protein Portfolio)
LANL GFP Portfolio

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DNA Polymorphism Identity Determination Using Flow Cytometry and DNA Base Mismatch Detection Using Flow Cytometry
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Cary, Robert Bruce
Field Deployable Device for Pathogen Detection

Chen, Jun
Field Deployable Device for Pathogen Detection

Chen, Lei
Field Deployable Device for Pathogen Detection

Choi, Woong
Aligned Crystalline Silicon

Collins, Michael Loren
K-Edge Hybrid Densitometer Software

Collis, Gavin E.
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Contreras, Paul John
Passive Glovebox Leak Detector

Coulter, James Yates
License - 05-C01724 Titled: Superconductivity Technology

Cournoyer, Michael Edward
Passive Glovebox Leak Detector

Cremers, David Allen
Laser Production of Articles from Powders (Directed Light Fabrication)

Dale, Taraka T.
Field Deployable Device for Pathogen Detection

Depaula, Raymond F.
Superconductivity Technology
CNT Portfolio for Structural Applications

Dixon, Raymond Daniel
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Driscoll, Judith Louise
Superconductivity Technology

Eads, Damian R.
Genie Pro, Version 2.0

Edlund, Kimberley Marie
Genie Pro, Version 2.0

Ehler, Deborah Sue
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Water Soluble Polymers and their use in Removal of Metals

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Esch-Mosher, Diana M.
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Espy, Michelle A.
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Fraser, Andrew Mcleod
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Method for producing ceramic particles agglomerates
Spherical boron nitride particles and method for preparing them

Goddard, Greg Russ
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Gohdes, Joel W.
Water Soluble Polymers and their use in Removal of Metals

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Hansen, Walter J.
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Harker, William Clarkson
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Harvey, Neal Richard
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Havrilla, George Joseph
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

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Herrmann, Hans W.
Atmospheric Pressure Plasma Jet Portfolio

Hicks, Robert F.
Atmospheric Pressure Plasma Jet Portfolio

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Hollas, Charles Lawrence
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Horley, Earl Christopher
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Howat, Andrew Michael
SABRINA

Hsu, Chung-Hsing
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Ianakiev, Kiril Dimitrov
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Jiang, Honggang
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SABRINA

Jones, David C.
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Kaduchak, Gregory
Low-Cost Portable Flow Cytometry

Kale, Ramesh
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Kelley, Thomas A.
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Klimenko, Alexei Vasilievich
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Lewis, Gary K.
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Polymer-Assisted Deposition of Metal Oxides and Nitrides

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Lin, Yuan
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Makela, Mark F.
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Matlashov, Andrei Nikolaevich
Ultra-Low Frequency NMR

McCleskey, Thomas Mark
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Mikhailovski, Alexandre Alexeevich
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Milewski, John Otto
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Miller, Thomasin Clare
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Minogue, Edel Mary
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Morris, Christopher
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Nemec, Ronald Bart
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Air Breather Fuel Cell

Newell, Matthew R.
Hand Held Multiplicity Register

Nolan, John Paul
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O'Connell, Michael John
CNT Portfolio for Structural Applications

Olsher, Richard H.
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Proton Recoil Scintillator Neutron Rem Meter

Orum, John Christopher
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Ott, Kevin Curtis
Hybrid Catalyst for Selective Reduction of NOx (also known as ENDURE SCR Catalyst)

Park, Jaeyoung
Atmospheric Pressure Plasma Jet Portfolio

Parker, Robert Francis
Advanced Multiplicity Shift Register (AMSR)
MiniGRAND Family of Instruments

Pautz, Shawn Daniel
Attila, Version 2.0

Pelowitz, David George
Advanced Multiplicity Shift Register (AMSR)
MiniGRAND Family of Instruments

Perkins, Simon John
Genie Pro, Version 2.0

Perry, William L.
Nanostructured Materials for Automotive Applications
Plasma Torch Production of Metal Particles of Controlled Sizes
Low Power Plasma Production of Metallic Nanoparticles

Phillips, Jonathan
Nanostructured Materials for Automotive Applications
Method for producing ceramic particles agglomerates
Spherical boron nitride particles and method for preparing them
Plasma Torch Production of Metal Particles of Controlled Sizes
Low Power Plasma Production of Metallic Nanoparticles

Porter, Reid Buchanan
Genie Pro, Version 2.0

Priedhorsky, William
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Prime, Michael Bruce
System and Method for Measuring Residual Stress

Qian, Jiang
Diamond Silicon Carbide Composites and their Method for Preparation

Reagor, David Wesley
Through-the-Earth Radio Technology

Reass, Pamela Sue
Advanced Multiplicity Shift Register (AMSR)
MiniGRAND Family of Instruments

Robison, Thomas Wayne
Water Soluble Polymers and their use in Removal of Metals

Rodgers, John C.
Continuous Air Monitor (CAM) Technology
Alpha Environmental Continuous Air Monitor with Cyclo-Shroud Inlet

Rodriguez, Marko A.
Social Semantic Networks For Distributing Contextualized Information–also known as "Particle Pipes"

Romero, Amos M.
Advanced Multiplicity Shift Register (AMSR)

Ryan, Robert Howard
Work Package Generator (WPG) Software

Salazar, Steven Don
Advanced Multiplicity Shift Register (AMSR)

Salzman, Gary Clyde
Low-Cost Portable Flow Cytometry

Sampson, Thomas E.
PC/FRAM, Version 2.3

Saunders, Alexander
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Schmidt, Jurgen G.
Piperazine-based Nucleic Analogs
Field Deployable Device for Pathogen Detection

Schultz, Larry Joe
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Seagraves, David Troy
Proton Recoil Scintillator Neutron Rem Meter

Selwyn, Gary Stewart
Atmospheric Pressure Plasma Jet Portfolio

Shera, E. Brooks
Single Molecular Detection Instrument Diagnostic Test (Ordered Transport and Identification of Particles)

Silks, Louis A.
Piperazine-based Nucleic Analogs

Sinha, Dipen N.
Low-Cost Portable Flow Cytometry

Smith, Barbara Florence
Water Soluble Polymers and their use in Removal of Metals

Song, Jian
Field Deployable Device for Pathogen Detection

Sossong, Michael James
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Staab, Torsten Albert
Field Deployable Device for Pathogen Detection
Hands-Off Sampling Device for capturing and logging field samples with minimal human contact, tracking sample/environmental information, and assigning to responsible field personnel

Stan, Liliana
Superconductivity Technology

Stubben, Christopher John
Field Deployable Device for Pathogen Detection

Stutz, Roger Alan
Ultrahigh Vacuum Focused Ion Beam Micromill Technique

Sullivan, Enid Joan
ProAqua

Swanson, Basil Ian
Field Deployable Device for Pathogen Detection

Sweet, Martin Russell
Advanced Multiplicity Shift Register (AMSR)
SuperHENC Neutron Coincidence Code, Version 1.0

Swift, Gregory William
Pulse Tube Refrigerator with Variable Phase Shift and Traveling Wave Device with Mass Flux Suppression

Terwilliger, Thomas Charles
SOLVE, Version 1.0
SOLVE, Version 2.0
SOLVE/RESOLVE, Version 2.0

Theiler, James Patrick
Genie Pro, Version 2.0

Unkefer, Pat Jean
Use of Prolines for Improving Growth and Other Properties of Plants and Algae

Usov, Igor Olegovich
Superconductivity Technology
CNT Portfolio for Structural Applications

Vaccaro, Henry Sebastian
WISDOM and SENSE (W&S)

Van De Sompel, Herbert
Blackbox Version 1.0

Van Riper, Kenneth Alan
SABRINA

Vasquez-Dominguez, Jose
Through-the-Earth Radio Technology

Vo, Duc Ta
PC/FRAM, Version 2.3

Volegov, Petr Lvovich
Ultra-Low Frequency NMR

Waldo, Geoffrey S.
GFP Split, Insertion
Protein Folding and Solubility Screening, using a Green Fluorescent Protein Research Tool
Self Assembling Split Fluorescent Protein System (Los Alamos Green Florescent Protein Portfolio);
LANL GFP Portfolio

Wang, Haiyan
Superconductivity Technology

Ward, Michael Dennis
Low-Cost Portable Flow Cytometry

Wareing, Todd Arlin
Attila, version 2.0

Warner, Benjamin Peter
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Weisbrod, Kirk Ryan
ProAqua

Wells, Cyndi Ann
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

West, James Terrell
SABRINA

White, Paul Scott
DNA Polymorphism Identity Determination Using Flow Cytometry and DNA Base Mismatch Detection Using Flow Cytometry

Wilson, Mahlon Scott
Adiabatic Fuel Cell Stack
Composite Bipolar Plates for Electrochemical Cells
Air Breather Fuel Cell

Zhang, Xiefei
CNT Portfolio for Structural Applications

Zhao, Yusheng
Diamond Silicon Carbide Composites and their Method for Preparation

Zheng, Lianxi
CNT Portfolio for Structural Applications

Zhu, Yuntian Theodore
CNT Portfolio for Structural Applications
Manufacture and Application of Nanostructured Metals and Alloys

Fiscal Year 2009 Executed Cooperative Research and Development Agreements (CRADAs)

Alcohol or Olefin Production from Cellulosic Sugars and Glycerin

Louis A. Silks (B-8)

Develop materials from renewable resources (e.g., biomass-based feedstocks such as sugars, glycerin, etc.) using mild catalytic processes. Compared to typical petroleum-based feedstocks, biomass-based feedstocks are chemically over-functionalized. Therefore, new technologies will be developed that will allow for selective removal of functionality in order to fully utilize many of the biomass components.

Disruptive Market Innovation

Steven F. Stringer (TT-DO)

Model Disruptive Market Innovation (DMI). The objective of this work is to better evaluate DMI projects and provide decision makers with perspective on the following questions: How will different consumer segments respond (timing and volume) to specific DMI projects? How well can the participants utilize their experience and knowledge of consumer behaviors to evaluate their DMI portfolio? What types of DMI projects are better evaluated using rule-based knowledge versus statistical analysis?

A Novel Approach to Recover Heavy Oil from Sand Formations: Phase I Effort

Robert Jason Scharff (DE-9)

Provide technical insight into the feasibility of utilizing alternative alloys as viable materials in the design of critical flow nozzles. LANL will leverage its expertise in computational fluid dynamics modeling and material science capabilities to determine the optimal engineering parameters necessary for the design and prototyping of a critical flow nozzle relevant to the participant's intended application.

Atomistic Investigation of the Surface Chemistry Leading to Alloy Corrosion During Petroleum Refining Operations

Christopher David Taylor (MST-6)

Develop a kinetic understanding of corrosion processes that occur during petroleum refining operations using a combination of first principles and kinetic Monte Carlo techniques.

Study of the Imaging and Material Discrimination Capabilities of the GMT Scanner for the Detection of Explosive Threat Objects

Christopher Morris (P-25)

Investigate the use of LANL's muon tomography technology to detect and identify potential threat objects. The goal of this research and develop-

ment project is to cooperate in the acquisition of data from a muon tomography scanner, the reduction of that data to particle trajectories, and the analysis of reconstructed charged particle scattering and stopping to produce a three-dimensional image.

Standoff Warning Against Radiological Materials (SWARM) Sensors

Sean M. Brennan (ISR-3)

Develop an alternate approach to radiological sensing utilizing multiple mobile, highly distributed sensors in an integrated system promoting cooperative behavior (i.e., swarming) amongst the sensors in an effort to reduce search time and cost, while maximizing detection confidence and reducing false alarms. This research will develop a methodology and architecture for evaluating this dynamic, networked radiation sensor system of systems.

Tools for a Preservation-Ready Web

Herbert Van De Sompel (STBPO-RL)

Develop tools that leverage and promote existing technologies such as OAI-PMH, MPEG-21 DIDL, and the Atom Syndication Format, and make those tools an integral part of standard Web server software. This software will provide preservation clients with a uniform manner to interact with enabled web servers. This will yield a far better coverage of the Web for digital preservation activities than the current crawling-based techniques. It will also provide preservation clients with a uniform approach in which to-be-preserved documents are represented to them, yielding a more straightforward handling process.

Development of a Commercial Enzyme System for Lignocellulosic Biomass Saccharification

Andrew M. Bradbury (B-9)

LANL has developed a novel method to thermostabilize proteins, termed Internal Destabilization Evolution and Synthesis. This will be applied to cellulases provided by the CRADA partner to develop a thermostable cellulose.

BSCCO-2212 Round Wires for Very High Field Magnet Applications

Terry George Holesinger (MPA-STC)

Superconducting wires based on the high temperatures superconductor (HTS) Bi2Sr2CaCu2Oy (Bi-2212 or BSCCO-2212) are of interest for use in high field magnets for nuclear magnetic resonance (NMR) and advanced accelerator magnet designs for high energy physics applications. These wires are composite materials comprised of the oxide HTS and a metal sheath, which is typically silver or a silver alloy. The material science base needed for making Bi-2212 wires has been demonstrated. The powder synthesis, wire (composite) development, and thermal heat treatments are complex and interrelated processes. The translation of the science base into a practical, homogenous conductor technology will involve developing a detailed understanding of the interplay between variables and their cumulative effects on the critical current density (JC) and engineering critical current density (JE).

EnergyFit Optimization

Chung-Hsing Hsu (CCS-1)

Conservation is a matter of national energy security. One of the many technical approaches to conservation is devising ways to optimize energy usage, i.e., decrease waste. It is widely recognized that data-intensive computing consumes huge quantities of energy, a central topic in industry and the national discourse. In response to this issue, LANL has a patent-pending software technology called EnergyFit that is anticipated to optimize energy usage significantly in computers of all shapes and sizes. Thus, this technology stands to make a very large contribution to the optimization of energy usage in computing and subsequent decrease in energy expenditure, cooling requirements, and operating cost. LANL and the participant will jointly commercialize EnergyFit during this partnership by modernizing and enhancing the existing software version.

Conductive, Wavelength-Shifting Optical Coatings for Facilitating the Detection of Neutron/Helium Interaction-Induced Scintillation

Martin D. Cooper (P-25)

Develop and evaluate conductive and non-conductive, optically clear and smooth coatings on the inside walls of the acrylic cell used at LANL for studying the electrical dipole moment of neutrons at liquid helium temperatures.

Cutting Edge Science Series for Science, Technology, Engineering, and Math

Steven F. Stringer (TT-DO)

Develop a standards-based online science course for high school credit that will cover alternative and renewable energy and fuels using the Socratic method of teaching. The course will be the first in a series addressing issues and solutions that are relevant to national energy security. Links embedded in the online content will lead students to multimedia features including mini-games, simulations, a website, digital lab activities, audio, animations, still images, video interviews with LANL scientists, and videos of virtual field trips to LANL facilities. The cross-curricular course will offer investigation through various sciences, including chemistry, biology, earth science, geography, economics, ecology, and engineering.

CartaBlanca Integration

Duan Zhong Zhang (T-3)

Extend the functionality of Carta–Blanca in order to make it more suitable for commercial use in multi-physics analysis. Specifically, this partnership is intended to address simulation needs in infrastructure modeling for the defense, intelligence, military, homeland security, and commercial markets.

Cost-Effective Production of Algal Biofuels

Greg Russ Goddard (B-9)

Develop proof of principle that acoustic methods developed at LANL can be used for cost-effective harvesting of algal-produced lipids for biofuel production.

Parameterization and Upscaling of Subsurface Flow and Transport Models

John David Moulton (T-5)

In the context of a DOE SBIR Phase II Grant entitled "A New High-Resolution Method for the Characterization of Heterogeneous Subsurface Environments: Providing Flow and Transport Parameters via the Integration of Multi-Scale HydroGeophysical Data," New England Research, Inc. (NER), in collaboration with LANL scientists, will develop a set of hydrologic parameter sets to be used in modeling contaminant transport in chromium- and uranium-contaminated "legacy waste" subsurface sites at LANL and at the Hanford 300 Area (Pacific Northwest National Laboratory). NER will generate critical hydrogeophysical parameters, derived from high-resolution multi-physics scanner measurements of core samples, to develop physical models that enable DOE LANL scientists to produce high-performance, site-scale computations of subsurface contaminant transport and reduce prediction uncertainties.

Fiscal Year 2009 Work for Others – Non Federal Agreements Executed

Blue Waters Project

Adolfy Hoisie (CCS-1)

LANL is the performance modeling arm of the Blue Waters Project. LANL's contribution to the project is in creating the modeling tools for the system and for the applications of interest, such as system optimization, application optimization and engineering, and level of performance. LANL will investigate the use of the models dynamically in order to mitigate the impact of inefficiencies.

Strategy for Enhanced Light Output from Luminescent Nanoparticles

Luiz Gustavo Jacobsohn (MST-8)

A highly promising technology for ubiquitous radiation sensing based on nanocomposite scintillators was recently proposed to overcome the need for expensive, size-limited single crystals. We aim to identify important chemical and physical mechanisms that control luminescence and to explore controlled surface modification to increase output light and quantum yield.

Improving Algal Production of Lipid Feedstock for Biodiesel

Pat Jean Unkefer (B-DO)

LANL will carry out detailed small-scale characterization of a LANL invention, a growth management compound known as TakeOff. This work will examine key parameters of algal growth and lipid production to assess the potential for using this material to improve production of algal lipid feedstocks for biodiesel production.

Virus and Host Effects on HIV Molecular Evolution

Thomas Kenneth Leitner (T-6)

HIV DNA sequence data will be analyzed to answer questions related to HIV-host interactions. Novel DNA sequencing technology allows for massively parallel sequencing reactions and thus the generation of very large data sets. Together with large sample banks and the new sequencing technology, outstanding questions related to HIV genetic variation and evolution can now be addressed. Sponsor will generate the data, and LANL's primary effort will come in the areas of computational analysis, including phylogenetics, statistics, and bioinformatics.

Mass Spectrometry Standard

Jurgen G. Schmidt (B-7)

LANL will prepare standards containing enriched stable isotopes of interest to the Centers for Disease Control and Prevention (CDC) for the sponsor.

Micro Photonic Doppler Velocimetry (Micro PDV) of Chip Slappers

Steven Anderson Clarke (W-6)

Micro PDV is a technique to measure the velocity of small "flyers" or "slappers" from a chip slapper. Characterizing the velocity of the flyer is critical to understanding the operation of a chip slapper detonator for both the DOE and DoD.

High Altitude Water Cherenkov (HAWC) Observatory Development

Brenda L. Dingus (P-23)

LANL will work on the development of the High Altitude Water Cherenkov (HAWC) gamma-ray observatory. HAWC is a next generation version of the Milagro Observatory at LANL. HAWC will be greater than 10 times more sensitive than Milagro. Milagro has recently ceased operations, and many parts will be recalibrated and used for HAWC. The HAWC observatory will be the most sensitive detector for surveying the sky for astrophysical sources of very high energy gamma rays.

Population Genetics of Clostridium Botulinum

Karen Koons Hill (B-7)

LANL will use its knowledge and expertise of Clostridium botulinum to review key publications about this bacterial species and its neurotoxins. A concise report will be provided that examines species variation, known genetic markers, available genomic sequences, and diagnostic technologies. This final report will be a comprehensive review of the current scientific literature that includes interviews with experts, will assess our current understanding of this organism, and will help identify future research needs.

Technical Support for Utility and System Requirements Studies for Remote Sensing Technologies

Kevin L. Mitchell (C-PCS)

LANL will investigate the utility of low light, thermal, and spectral imaging technologies with the goal of gaining an expanded understanding of the system requirements for expected and planned-for capabilities. LANL will provide technology implementation comparisons based on its past experiences with analyzing, building, and operating these systems.

Antibodies against Sulfur Mustard Induced Portein Modifications

Andrew M. Bradbury (B-9)

LANL will select one or more single chain Fv fragments (scFv's) able to recognize sulfur mustard modified human serum albumin, but not unmodified albumin. The Kd of these antibodies should be 1-5 uM.

Burkholderia Pseudomallei Targets

Murray Alvin Wolinsky (B-7)

LANl will identify peptide (amino-acid) sequences that may have broad therapeutic value as drug targets and, in particular, lead to effective countermeasures to the pathogen Burkholderia pseudomallei.

Magnetization Measurements of Fine Magnetic Powders

Vivien Zapf (MPA-CMMS)

Fine powders of Cu-containing materials with potential applications in fuel cell technology will be characterized using sensitive magnetization measurements to determine the relative concentration of magnetic elements.

NSF EAR-0809644 Great Basin Hydrothermal

Carl Walter Gable (EES-16)

Recent studies suggest that deep, permeable fault zones are needed to account for heat flow anomalies across the Great Basin. It is likely that Quaternary tectonics are ultimately responsible for creating the high permeability faults systems associated with the modern geothermal features and gold mineralization across the Basin and Range. However, many questions/issues remain as to the exact nature of these flow systems. We propose to

address these issues by three-dimensional quantitative analysis of both the modern and fossil hydrothermal systems near Beowawe and Carlin, Nevada, and by dating the hot spring sinter deposits at Beowawe.

Proposed Applications for Raydiance Ultra-short Pulse Laser for the Center for Integrated Nanotechnologies

Quinn McCulloch (MPA-CINT)

Study the feasibility of the Raydiance USP laser platform for use in various applications. In particular, the applications to be investigated are micron- and nanometer-scale laser machining and the generation of coherent mid-IR radiation.

Instruction on the Realities of Terrorists Seeking Nuclear Weapons

Brian G. Rees (N-2)

The instructor will discuss vulnerabilities of national security as it relates to terrorist acquisition of nuclear weapons.

Process Hazardous Analysis for the ITER Organization

William Kirk Hollis (C-CDE)

LANL will demonstrate the scientific and technological feasibility of fusion energy. The fusion power will be up to 10 times greater than the external power delivered to heat the plasma. This will be the premier scientific tool for exploring and testing magnetically controlled, burning plasmas. (The fusion process itself provides the dominant heat source to sustain the plasma temperature.) It will provide key information needed to move toward practical fusion energy.

Upgrade Hepatitis C Database

Carla Louise Kuiken (T-6)

We will upgrade the HCV database and associated scripts and tools in order to make the database maintainable and accessible for users.

Technologies for Applications in Social Computing (TASC) Senior Advisory Committee

Edward Patrick MacKerrow (IAT-1)

Established to assess the feasibility of developing new technologies to rapidly create theoretically-informed, data-driven models of complex human, social, cultural, and behavioral dynamics that are instantiated in near-real-time simulations.

Distinguished Awards for 2009

Distinguished Patent Award

The Distinguished Patent Award honors inventors whose patented invention exhibits outstanding innovation. The award is selected by the Laboratory Patent Advisory Council 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.

2009 Award Winner

The 2009 Distinguished Patent Award goes to the patent titled "Controlling the Pressure within an Annular Volume of a Wellbore," submitted by Robert Hermes of the Technology Transfer Division. The patented invention provides a material and method for replacing the spacer fluid within an annular volume of a casing system within a wellbore with a modified fluid which shrinks when heated during the oil production phase of deep water oil well development. In other terms, the new shrinking spacer fluid alleviates the expected expansion which can then reduce the risk of a casing failure due to increasing temperatures and pressures in the trapped fluids in deep water wells.

This patent is currently the basis of a Cooperative Research and Development Agreement (CRADA) with Chevron to help reduce Trapped Annual Pressure, which is an issue in subsea completed wells. The technology reduces the risks of catastrophic well failure, thereby minimizing or eliminating a potential environmental disaster.

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 Los Alamos National Security LLC, 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.

2009 Award Winner

The 2009 recipient of this award is Pat Unkefer of the Bioscience Division. Her innovation led to the creation of Take-Off®, a licensed product based on a metabolic plant

stimulant that increases plant photosynthesis rates by coordinating a plant's uptake of nitrogen from the soil and its use of carbon dioxide for growth. As a synthesized version of a naturally occurring plant metabolite (an amino acid), Take-Off® accelerates growth—thereby speeding plants to maturity and harvest—and enhances yield without the use of growth hormones. It can be applied as a spray to a plant's leaves or added to water and nutrient solutions to be absorbed by the plant's root system. Both application methods are equally effective. Take-Off® was developed for use across a wide variety of crops including: vegetables, citrus, wheat and grains, flowers and biomass energy crops. The benefits to Take-Off® include the allowance of multiple crop cycles per acre in each growing season, a reduction in water and fertilizer requirements by shortening growing time and a decrease in nitrate runoff from fields by increasing plants' nitrogen uptake as well as an increase in harvestable yield. In addition, Take-Off is compatible with many other products and growers can combine with existing formulations to reduce the need for separate applications. Pat Unkefer played a central role in developing the innovation into a technology that provided value to industry and worked over many years to refine the technical base and the associated patent portfolio to create a valuable package. The chemical additive portfolio was licensed to Biagro Western Sales Inc. of Visalia CA and has resulted in the commercial Take-Off® product as well as extensive technical and field trial validations that have increased the profile and value of this product. Biagro Western has aggressively introduced Take-Off® and is experiencing rapid growth in Europe and introduced Take-Off® to US markets this year.

Programmatic Impact Award

The Programmatic Impact Award honors individuals or groups who have made advancements to the programmatic mission of Los Alamos National Laboratory through their interactions with industry partners. Nominees have interacted with industry partners through a technology transfer mechanism (Cooperative Research and Development Agreement, Work for Others, Licensing, User Facility Agreement, or Memorandum of Understanding) to add value to the technology field in which they work for programmatic and commercial uses.

The recipients of this award demonstrate stellar technical prowess as well as the innovation and creativity needed to demonstrate excellence in both programmatic and commercial applications.

2009 Award Winners

Mark Wallace of the Global Security Programs (GS-PO), Shawn Tornga, Andrew Hoover, David Palmer and Mark Galassi of the Space Science and Applications Group (ISR-1), Larry Schultz of the Applied Modern Physics Group, and Michal Mocko of the Los Alamos Neutron Science Center (LANSCE) are the recipients of the 2009 Programmatic Impact Award for their efforts in the Stand-Off Radiation Detection System (SORDS) Program.

The U.S. Department of Homeland Security's (DHS) Domestic Nuclear Detection Office (DNDO) has the goal to develop advanced nuclear detectors that demonstrate the ability to autonomously determine the type and location of radiation sources at much greater distances than current technology in order to help protect the homeland. The Los Alamos National Laboratory (LANL) team partnering with major defense contractors has successfully demonstrated in the field a new system. The system has several of the major attributes required by the DNDO Program Office for deployment. The advances made through extended hours and dedication from hardware to software has put the LANL activity in a strong position to compete for additional program challenges in this area. Both the sponsor and other members of the program have commended LANL's extraordinary responses to some difficult challenges encountered during the deployment of the system.

Distinguished Copyright Award

The Distinguished Copyright Award honors the authors of disclosed copyrighted materials that are considered extraordinary creations. Nominated copyrights for this 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.

2009 Award Winner

The 2009 Distinguished Copyright Award is awarded to the "RADIUS™" copyright by Lakshman Prasad of the Space and Remote Sensing Group (ISR-2) and Sriram Swaminarayan of the Applied Computer Science Group (CCS-7). RADIUS™ (Rapid Automated Decomposition of Images for Ubiquitous Sensing) is a computational framework for structural representation of images using polygons instead of pixels.

RADIUS utilizes a sparse but informative subset of pixels, namely edge pixels as anchor points for a Delaunay triangulation of the image. The triangulation serves as an image-adaptive grid from which perceptual underpinnings of human vision such as proximity, symmetry, continuity, etc., between edges are computed. Using these relationships as grouping criteria, the triangles are selectively merged to obtain visually meaningful polygons. This rapidly reduces data by three orders of magnitude, from millions of pixels down to thousands of polygons, paving the way for efficient image analysis. RADIUS renders 1 megapixel per second on a 3.0 GHz Intel Xeon processor, or roughly 15 megapixels per second on an 8 core 2.66 Ghz Intel Xeon processor with 32 GB of RAM.

Once the first layer of polygons is created, RADIUS hierarchically agglomerates the polygons into layers, each at a coarser level. At different levels different scale features will emerge, allowing the analyst (user) to quickly tag features of interest and then move on to the next image.

RADIUS' applications range from geospatial image analysis to general content-based image search and retrieval, scalable image rendering, graphics, and compression.

The RADIUS Team is seeking commercial partners who will integrate the technology into both the government and commercial markets and build partnerships with LANL to continue the R&D efforts of the project through Cooperative Research and Development Agreements (CRADAs). Following the GEOINT 2009 conference last October, LANL has issued over half a dozen test and evaluation licenses for the RADIUS software. LANL's licensing strategy is to issue a number of exclusive and non-exclusive commercial licenses in various fields of use, for both narrow and broad applications.

Regional Impact Award

The Regional Impact Award honors individuals, organizations, or programs that have made a significant contribution to the northern New Mexico economy. Recipients must have a tie to LANL technology, personnel, or expertise. (Per Appendix N of the LANS, LLC M&O Prime contract, the Laboratory actively encourages the development of new businesses based on Laboratory technology or expertise.)

Nominees for this award must demonstrate northern New Mexico economic impact through the creation or growth of LANL-affiliated venture(s), creation of new jobs or new products, or implementation of a unique resource for entrepreneurs. In addition, the individual, organization or program must reflect the spirit of entrepreneurship through personal risk taking, strong personal commitment, ingenuity, and act as a role model for regional innovation.

2009 Award Winner

The recipients of the 2009 Regional

Impact Award are Chevron Energy Technology Company and the Laboratory retirees that formed Chevron's Area 52 research facility in Santa Fe. This facility both created new jobs and new products based on Laboratory technology. The retired Laboratory staff includes: Daniel Neagley, Don Coates, Clark Thompson, Dave Beck, Pat Rodriquez, Jake Archuleta, Bill Coulter, Bob Williford and George Nichol. The total staff at Area 52 now encompasses 14 employees. Chevron's efforts for the creation of Area 52 are credited to: Manny Gonzalez, Scot Ellis and Jeannette Underwood.

The basis for the formation of Area 52 is the commercialization of the Laboratory's Inficomm technology for oil/gas applications. This transformational technology allows for groundbreaking wireless technology for use down-hole in wells and incorporates innovative proprietary sensor technology which eliminates the need for down-hole power or batteries. The initial benefit of the technology will include real time temperature, pressure and fluid levels reading in wells. Additional sensors are in development at both the Laboratory and Area 52.

The current oil and gas applications for the Inficomm technology were developed under a Cooperative Research and Development Agreement (CRADA) between LANL and Chevron. At the successful completion of the CRADA, the technology was matured from proof of principal experiments to beta prototypes. The newly formed Area 52 in Santa Fe continued the engineering and commercial prototype development. This research facility began with one purpose: to complete the down-hole applications of Inficomm into a commercial product. After the completion of prototype and down-hole testing, a new spin-off company called Inficomm, Inc. was created to take this technology into the marketplace. The Inficomm technology will increase the efficiency and extraction of oil while allowing for the management of large oil fields. This technology will have a positive impact on U.S. energy security. The successful commercialization of this technology could not have been accomplished without the Area 52 concept. The Area 52 research facility will continue with its additional sensor developments and improvements to the Inficomm technology in addition to broadening its mission to include the commercialization of other Laboratory technologies.

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.

The disclosure process provides Laboratory Legal Counsel with the information necessary to file a patent application and the TT Division with the vital information needed for successful, commercial, non-commercial, and academic licensing and transfer of an invention to the public/private sector.

After submission, invention disclosures are routed electronically for approvals, archiving, and entry into TT Division's Opportunity Module. Launched in November 2005 as a part of TT Division's commitment to streamlining, 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 annually has continued to increase over the past four years since the launch of IDEAS.

To process a disclosure visit:
www.lanl.gov/my_idea

Regional Economic Development Programs

Technology Maturation Fund

Technology Transfer's Technology Maturation Fund was developed to provide small amounts of funding to move highly focused early stage technologies within the Laboratory along the road to commercialization. Unlike many types of funding within the Laboratory, these awards are not granted for a specific time period but rather to achieve a specific milestone in a defined development path leading to commercialization. The funds are meant to remove specific hurdles to development of early stage technologies in the Laboratory.

Los Alamos Venture Acceleration (LAVA) Initiative - LabStart

This pilot program is designed to strategically spin off technology-based companies from the Laboratory with emphasis on establishing new businesses in northern New Mexico. Through the agreement with partners ARCH Venture Partners and the Verge Fund, the Laboratory will contribute up to $1 million over three years to complement the contribution of time and effort from the ARCH-Verge team of 20 investment professionals, including 8 located in New Mexico. The Los Alamos LabStart office will provide the external business guidance, market validation, and maturation funding, and assemble the external technical and management teams required to bring promising technologies to the equity financing stage. Labstart will also be responsible for securing pre-seed and/or seed financing for subject ventures, as appropriate.

Entrepreneurial Leave of Absence (ELOA) Policy

The ELOA policy allows employees to take an unpaid leave, for a limited period, to pursue entrepreneurial activities utilizing Laboratory technology or intellectual property. The policy also allows the employee to retain access to certain Laboratory benefits. The purpose of the program is to reduce risk for Laboratory employees and to facilitate the attempt to start new businesses.

Market and Business Planning Assistance

Technology Transfer works with the Lab's technical staff to assess and package technologies that could form the basis of a new company, and with regional entrepreneurs to help them access the knowledge, skills, funds, and business connections necessary for success. Additionally, through TT's MBA Internship Program initiated in 1996, MBA candidates evaluate Los Alamos inventions for commercialization potential, collaborating with the inventors to develop technology transfer strategies, and work with regional small businesses to address their business concerns.

Northern New Mexico Connect

Launched in December 2007, sponsored by LANS and LANL in partnership with the Regional Development Corporation, NNM Connect is growing an ecosystem for enterprise development and networking for long-term economic growth in the region. It is designed to help build an innovation community in northern New Mexico through the investment of stakeholders. The NNM Connect network includes the following programs:

Networking and Education

The Networking and Education program is designed to promote the exchange of ideas, explore new business avenues, and create regional partnerships. It also provides entrepreneurs with opportunities to gain business know-how and establish new networks.

LANS Venture Acceleration Fund (VAF)

The VAF invests in creating and growing Northern New Mexico businesses that have an association with LANL technology or expertise. It funds up to $100,000 per project to businesses that use technology for commercial applications with market demand. Use of VAF awards includes activities such as proof-of-concept, prototyping, product engineering, customer acquisition and market validation.

LINK

LINK uses a community's own networks and resources to harness social capital for entrepreneurs. A community-based facilitator meets with the entrepreneur to understand his or her needs, then provides connections to networks and resources that help start, grow or improve the business.

Market Intelligence

Market Intelligence helps entrepreneurs and businesses make better decisions. Market Intelligence analysts first meet with entrepreneurs to discuss and refine their needs, ideas and questions. The analysts then customize research of sophisticated data sources for the business, counsel the entrepreneur on their research findings and determine next steps.

New Mexico Small Business Assistance (NMSBA)

The NMSBA program offers technical assistance from scientists or engineers at Los Alamos or Sandia National Laboratories to New Mexico small businesses with a technical challenge that requires national laboratory expertise. NMSBA projects can involve testing, design consultation and access to special equipment or facilities. Other types of technical assistance may be provided through the Manufacturing Extension Partnership and the UNM Anderson Schools of Management.

Springboard

Springboard provides expert coaching for companies facing strategic decisions or activities such as securing funding, verifying a business model, building a management team, or penetrating a new market.

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.

Technology Transfer Division
Division Leader
Steve Girrens, 667-9473

Laboratory Counsel
Laboratory Counsel
David A. Sosinski, 667-3970

Intellectual Property Office
Group Leader
Bruce Cottrell, 667-9168

Technology Transfer Division www.lanl.gov/partnerships/

Laboratory Counsel
www.lanl.gov/orgs/lc/


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