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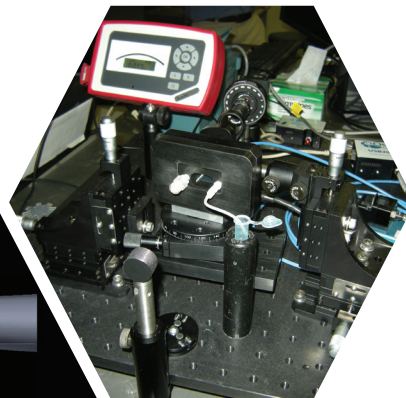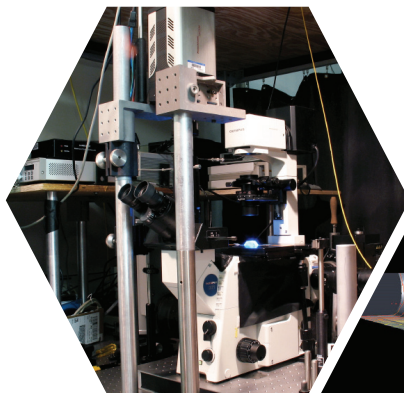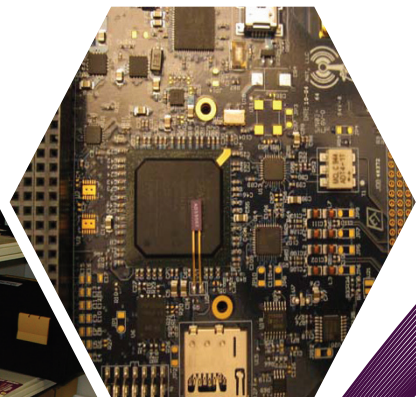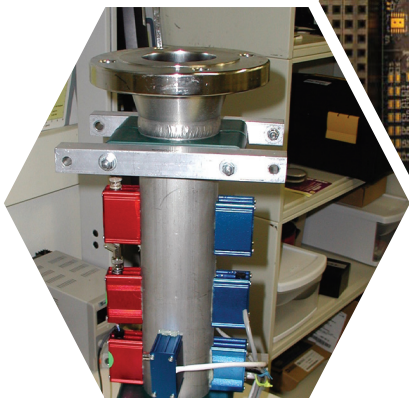
2010 Technology Transfer Awards
Carrying on the tradition of world-changing innovation.

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Carrying on the tradition of world-changing innovation

August 4, 2011
Los Alamos National Laboratory
Los Alamos, New Mexico

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NATIONAL LABORATORY
EST. 1943

Welcome to the 13th annual Technology Transfer Awards reception. Tonight we celebrate Los Alamos National Laboratory innovators and recognize their vital role in transferring important science and technology from the Laboratory to the private sector.

To meet our enduring mission in national security science, Los Alamos provides our nation with the best technical solutions to our most difficult problems. These solutions often have transformational impact in commercial applications as well. The accomplishments of tonight's honorees, inventors of copyrighted, patented, and licensed technologies, bring recognition to the Laboratory for our world-class science and engineering. The commercialization of these technologies helps to strengthen our economic security by creating jobs and enhancing U.S. industrial competitiveness. As Secretary of Energy Steven Chu said recently about technology transfer, "This is part of the reason we are being funded…now, more than ever, scientists, both in research universities and national labs will need to come to the aid of our country."

Tonight's honorees have done exceptional work to meet our programmatic missions. The additional work required to patent and copyright our best ideas is significant, and tonight's awards recognize their impact in moving ideas to products, partnering with industry to provide additional avenues for our unique Laboratory capabilities, and creating start-up companies and technology innovation with local companies here in Northern New Mexico. This work provides benefit back to our programs as well, because our science and engineering capabilities are strengthened.

On behalf of the Laboratory, I would like to congratulate this evening's honorees. Continued participation by Laboratory innovators in technology transfer activities will allow Los Alamos National Laboratory to increase the impact of our capabilities, and to grow our contributions to the region and the nation well into the future.

Charles McMillan
Laboratory Director

Keynote Speaker: Michael Roach
Founder of CleanAIR Systems

After graduation from Ohio State University in 1981 with a BS in Ceramic Engineering, Mr. Roach began his professional career at Corning, Inc. Positions held while at Corning include Production Management, Engineering and Sales and Marketing Manager responsible for Corning's world-wide diesel particulate filter product line. After leaving Corning in 1987, Mr. Roach co-invented a product associated with the control of diesel emissions and sold the rights to 3M Corporation. He continued to work with 3M on product development and sales related to the new product through 1990. Upon completion of the project for 3M, Mr. Roach became a consultant for Engelhard Corporation, helping to develop applications and markets for the company's diesel particulate filters. In 1993, Mr. Roach established CleanAIR Systems in Santa Fe, New Mexico with the goal of developing, manufacturing and selling innovative products to the growing emissions control market.

Under the leadership of Mr. Roach, the company achieved many milestones during its seventeen year history:
- Successfully developed and introduced thirteen new products
- Recognized as the leader of innovative emissions control solutions
- Achieved product verification from California Air Resources Board (CARB) and EPA
- Established an international customer base with certification in several countries
- Built an environmentally-friendly testing and manufacturing facility in Santa Fe, NM
- Awarded Technology Transfer Regional Impact Award by Los Alamos National Labs for significant contributions to New Mexico economy - 2007
- Executed an Allied Vendor Agreement with Caterpillar Corporation - 2008
- Awarded Small Business of the Year by the Santa Fe Chamber of Commerce and the City of Santa Fe - 2009
- Recognized in partnership with Los Alamos National Laboratory the Award of Excellence in Technology Transfer from the Federal Laboratory Consortium - 2010
- Awarded the 10th Annual EPA Clean Air Excellence Award - 2010
- Awarded several patents

In July 2010 Mr. Roach successfully completed negotiations with Caterpillar Corporation to purchase CleanAIR Systems.

Currently Mr. Roach continues working with the company through the transition period. In August of 2011 he will leave the company to pursue personal projects and is now a recovering entrepreneur.

Abstracts of Issued Patents

Listings are in accordance with issue dates from beginning to end of fiscal year 2010

3-Dimensional Imaging at Nanometer Resolutions

James Henry Werner (MPA-CINT)
U.S. Patent 7,675,045

An apparatus and method for enabling precise, 3-dimensional, photoactivation localization microscopy (PALM) using selective, two-photon activation of fluorosphores in a single z-slice of a sample in cooperation with time-gated imaging for reducing the background radiation from other image planes to levels suitable for single-molecule detection and spatial location, are described.

Acid-Catalyzed Dehydrogenation of Amine-Boranes

Ralph T. Baker (C-IIAC)
Frances Helen Stephens (C-IIAC)
U.S. Patent 7,645,902

A method of dehydrogenating an amine-borane using an acid-catalyzed reaction. The method generates hydrogen and produces a solid polymeric [RXR2B—NR3R4]„ product. The method of dehydrogenating amine-boranes may be used to generate H2 for portable power sources.

Aligned Crystalline Semiconducting Film on A Glass Substrate and Method of Making

Alp Tugrul Findikoglu
(MPA-STC)
U.S. Patent 7,781,067

A semiconducting structure having a glass substrate. In one embodiment, the glass substrate has a softening temperature of at least about 750°C. The structure includes a nucleation layer formed on a surface of the substrate, a template layer deposited on the nucleation layer by one of ion assisted beam deposition and reactive ion beam deposition, at least on biaxially oriented buffer layer epitaxially deposited on the template layer, and a biaxially oriented semiconducting layer epitaxially deposited on the buffer layer. A method of making the semiconducting structure is also described.

Apparatus and Method for Mapping an Area of Interest

Samuel Feller (AET-5)
Daniel Lawrence Cohen (AET-5)
Torsten Albert Staab (C-CDE)
U.S. Patent 7,627,448

We have developed a novel, low-cost, high-fidelity, field-portable system for mapping and visual playback of 3-D geospatial coordinates in indoor and outdoor environments. This system has applications in a wide variety of fields: sample collection, geographic information mapping, construction and repair, claims adjustment, and architectural planning.

Architecture for Coated Conductors

Haiyan Wang (MPA-CINT)
Stephen R. Foltyn (MPA-STC)
Paul Nelson Arendt (MPA-STC)
Liliana Stan (MPA-STC)
U.S. Patent 7,727,934

Articles are provided including a base substrate having a layer of an oriented cubic oxide material with a rock-salt-like structure layer thereon, and, a layer of epitaxial titanium nitride upon the layer of an oriented cubic oxide material having a rock-salt-like structure. Such articles can further include thin films of high temperature superconductive oxides such as YBCO upon the layer of epitaxial titanium nitride or upon a intermediate buffer layer upon the layer of epitaxial titanium nitride.

Biaxially Oriented Film on Flexible Polymeric Substrate

Alp Tugrul Findikoglu (MPA-STC)
Vladimir Matias (MPA-STC)
U.S. Patent 7,601,430

A flexible polymer-based template having a biaxially oriented film grown on the surface of a polymeric substrate. The template having the biaxially oriented film can be used for further epitaxial growth of films of interest for applications such as photovoltaic cells, light emitting diodes, and the like. Methods of forming such a flexible template and providing the polymeric substrate with a biaxially oriented film deposited thereon are also described.

Buffer Layer for Thin Film Structures

Quanxi Jia (MPA-CINT)
Haiyan Wang (MPA-CINT)
Stephen R. Foltyn (MPA-STC)
Paul Nelson Arendt (MPA-STC)
U.S. Patent 7,736,761

A composite structure including a base substrate and a layer of a mixture of strontium titanate and strontium ruthenate is provided. A superconducting article can include a composite structure including an outermost layer of magnesium oxide, a buffer layer of strontium titanate or a mixture of strontium titanate and strontium ruthenate and a top-layer of a superconducting material such as YBCO upon the buffer layer.

Catalyst and Reduction of Nitrogen Oxides

Kevin Curtis Ott (SPO-AE)
U.S. Patent 7,691,769

A Selective Catalytic Reduction (SCR) catalyst was prepared by slurry coating ZSM-5 zeolite onto a cordierite monolith, then subliming an iron salt onto the zeolite, calcining the monolith, and then dipping the monolith either into an aqueous solution of manganese nitrate and cerium nitrate and then calcining, or by similar treatment with separate solutions of manganese nitrate and cerium nitrate. The supported catalyst containing iron, manganese, and cerium showed 80 percent conversion at 113 degrees Celsius of a feed gas containing nitrogen oxides having 4 parts NO to one part NO2, about

one equivalent ammonia, and excess oxygen; conversion improved to 94 percent at 147 degrees Celsius. N2O was not detected (detection limit: 0.6 percent N2O).

Chalcogen Catalysts for Polymer Electrolyte Fuel Cell

Piotr Zelenay (MPA-11)
Jong-Ho Choi (MPA-11)
U.S. Patent 7,781,364

A methanol-tolerant cathode catalyst and a membrane electrode assembly for fuel cells that includes 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.

Charge-Free Method of Forming Nanostructures on a Substrate

Mark Arles Hoffbauer (C-CDE)
Elshan Aziz Akhadov (GS-WS)
U.S. Patent 7,759,229

A charge-free method of forming a nanostructure at low temperatures on a substrate. A substrate that is reactive with one of atomic oxygen and nitrogen is provided. A flux of neutral atoms of least one of oxygen and nitrogen is generated within a laser-sustained-discharge plasma source and a collimated beam of energetic neutral atoms and molecules is directed from the plasma source onto a surface of the

substrate to form the nanostructure. The energetic neutral atoms and molecules in the beam have an average kinetic energy in a range from about 1 eV to about 5 eV.

Coated Conductors

Haiyan Wang (MPA-CINT)
Stephen R. Foltyn (MPA-STC)
Paul Nelson Arendt (MPA-STC)
Liliana Stan (MPA-STC)
Igor Olegovich Usov (MST-7)
U.S. Patent 7,737,085

Articles are provided including a base substrate having a layer of an IBAD oriented material thereon, and, a layer of barium containing material selected from the group consisting of barium zirconate, barium hafnate, barium titanate, barium strontium titanate, barium dysprosium zirconate, barium neodymium zirconate and barium samarium zirconate, or a cubic metal oxide material selected from the group consisting of rare earth zirconates and rare earth hafnates upon the layer of an IBAD oriented material. Such articles can further include thin films of high temperature superconductive oxides such as YBCO upon the layer of barium-containing material selected from the group consisting of barium zirconate, barium hafnate, barium titanate, barium strontium titanate, barium dysprosium zirconate, barium neodymium zirconate and barium samarium zirconate, or a cubic metal oxide material selected from the group consisting of rare earth zirconates and rare earth hafnates.

Composition and Method for Storing and Releasing Hydrogen

David L. Thorn (C-IIAC)
Anthony Keiran Burrell (MPA-MC)
Kevin Curtis Ott (SPO-AE)
William Tumas (SPO-AE)
U.S. Patent 7,736,531

A chemical system for storing and releasing hydrogen utilizes an endothermic reaction that releases hydrogen coupled to an exothermic reaction to drive the process thermodynamically, or an exothermic reaction that releases hydrogen coupled to an endothermic reaction.

Controlling the Pressure Within an Annular Volume of a Wellbore

Robert E. Hermes (TT-DO)
U.S. Patent 7,743,830

A process 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.

Device for Hydrogen Separation and Method

Stephen Nick Paglieri (W-7)
U.S. Patent 7,611,565

A device for hydrogen separation has a porous support and hydrogen separation material on the support. The support is prepared by heat treatment of metal mi-
croparticles, preferably of iron-based or nickel-based alloys that also include aluminum and/or yttrium. The hydrogen separation material is then deposited on the support. Preferred hydrogen separation materials include metals such as palladium, alloys, platinum, refractory metals, and alloys.

Durable Electrooptic Devices Comprising Ionic Liquids

Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Benjamin Peter Warner (MPA-MC)
U.S. Patent 7,633,669

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 (CF3SO3-), bis(trifluoromethylsulfonyl) imide ((CF3SO2)2N-), bis(perfluoroethylsulfonyl) imide ((CF3CF2SO2)2N-) and tris(trifluoromethylsulfonyl) methide ((CF3SO2)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.

Electrochemical Detection of Single Molecules Using Abiotic Nanopores Having Electrically Tunable Dimensions

Mark Arles Hoffbauer (C-CDE)
Jose-Maria Sansinena (C-CDE)
Virginia Olazabal (C-CDE)
Elshan Aziz Akhadov (GS-WS)
Antonio Redondo (T-DO)
U.S. Patent 7,638,034

This disclosure describes a pore structure for single molecule detection and a method of making such pores. The membrane in which the pores are formed comprises a conductive polymer, such as poly-pyrrole. deposited onto a platinum electrode that is integrated into the inner structure of the pore. The pore dimensions can be controlled in real time by tuning the volume of the conductive polymer.

Enhanced Pinning in YBCO Films With BAZRO3 Nanoparticles

Stephen R. Foltyn (MPA-STC)
Judith Louise Driscoll (MPA-STC)
U.S. Patent 7,737,087

A thin film of a high temperature superconductive oxide having pre-cipitates of barium and zirconium randomly dispersed therein is disclosed together with a method of increasing flux pinning in a high temperature superconduc-tive oxide thin film structure by preparing the high temperature

superconductive oxide thin film structure from precursor materials for the high temperature supercon-ductive oxide and zirconium metal or a zirconium compound.

Enrichment of Light Hydrocarbon Mixture

David James Devlin (MST-7)
Dali Yang (MST-7)
Robert Steven Barbero (NCO-2)
U.S. Patent 7,771,569

The present invention includes an apparatus and method for use of distillation packing material made from a non-selective meso/micro-porous membrane that separates light hydrocarbon mixtures.

Freely Oriented Portable Superconducting Magnet

F. Coyne Prenger (AET-1)
Dallas Dwight Hill (AET-1)
Eric Nichols Schmierer (AET-1)
U.S. Patent 7,646,272

The disclosed invention is freely oriented, portable superconduct-ing magnet that can be operated in any physical orientation relative to gravity. Design features of the magnet allow it to be transported and operated by a single person. The magnet is a solenoid with circular cross-section that allows the most compact insulation of the cold portion. The liquid cryogen required for operation is stored separately from the magnet and is connected via a pump and flex-ible transfer lines. Composite, low-conducting straps are used to suspend the magnet and shield

layers within the vacuum vessel so that it may be placed in any spatial orientation.

Fuel Injector Utilizing Non-Thermal Plasma Activation

Louis Andrew Rosocha (P-24)
U.S. Patent 7,625,531

A non-thermal plasma assisted combustion fuel injector that uses an inner and outer electrode to create an electric field from a high voltage power supply. A dielectric material is operatively disposed between the two electrodes to prevent arcing and to promote the formation of a non-thermal plasma. A fuel injector, which con-verts a liquid fuel into a dispersed mist, vapor, or aerosolized fuel, injects into the non-thermal plasma generating energetic electrons and other highly reactive chemical species.

High-Resolution Analysis of Soil Elements with Laser-Induced Breakdown Spectroscopy

Michael Howard Ebinger (EES-14)
Ronny Dwain Harris (EES-14)
U.S. Patent 7,692,789

The disclosed invention is a new spectroscopic method for measur-ing total soil carbon that is based on atomic emission spectroscopy using laser-induced breakdown spectroscopy. In this method, a laser is focused on a solid sample and forms a microplasma that emits light characteristics of the elemental composition of the

sample. The emitted light is collected, spectrally resolved, and detected to monitor concentrations of elements via their unique spectral signatures.

High-Speed and High-Fidelity System and Method for Collecting Network Traffic

Eric H. Weigle (CCS-1)
Wu-Chun Feng (N-2)
U.S. Patent 7,783,739

The invention provides a dedicated operating system for network traffic collection in order to maximize efficiency, scalability and performance. A scalable infrastructure and apparatus splits the work to be done on one host onto multiple hosts. The first host captures packets, collects the relevant data from the packets and forwards the collected packet data to multiple other hosts, who either save, display, or process the data further. This architectural separation allows tasks to be pipelined and handled concurrently, effectively doubling the rate at which traffic can be recorded.

Lead-Free Primary Explosives

My Hang Vo Huynh (WEPEXP-7)
U.S. Patent 7,741,353

Lead-free primary explosives of the formula (cat)Y[MII(T)X(H2O)6-X]Z, where T is 5-nitrotetrazolate, and syntheses thereof are described. Substantially stoichiometric equivalents of the reactants lead to high yields of pure composi-

tions thereby avoiding dangerous purification steps.

Linear Electric Field Time-of-Flight Ion Mass Spectrometers

Herbert O. Funsten (ISR-DO)
U.S. Patent 7,781,730

Time-of-flight mass spectrometer comprising a first drift region and a second drift region enclosed within an evacuation chamber; a means of introducing an analyte of interest into the first drift region; a pulsed ionization source which produces molecular ions from said analyte of interest; a first foil positioned between the first drift region and the second drift region, which dissociates said molecular ions into constituent atomic ions and emits secondary electrons; an electrode which produces secondary electrons upon contact with a constituent atomic ion in second drift region; a stop detector comprising a first ion detection region and a second ion detection region; and a timing means connected to the pulsed ionization source, to the first ion detection region, and to the second ion detection region.

Mass Spectrometry-Based Method for Detection and Differentiation of Botulinum Neurotoxins

Jurgen G. Schmidt (C-DO)
U.S. Patent 7,611,856

The present invention is directed to a method for detecting the presence of clostridial neurotoxins

in a sample by mixing a sample with a peptide that can serve as a substrate for proteolytic activity of a clostridial neurotoxin; and measuring for proteolytic activity of a clostridial neurotoxin by a mass spectroscopy technique. In one embodiment, the peptide can have an affinity tag attached at two or more sites.

Metal Aminoboranes

John Cameron Gordon (C-IIAC)
Ralph T. Baker (C-IIAC)
David L. Thorn (C-IIAC)
Anthony Keiran Burrell (MPA-MC)
Troy Allen Semelsberger (MPA-MC)
Himashinie Vichalya Kaviraj Diyabalanage (MPA-MC)
Benjamin L. Davis (MPA-MC)
Roshan Shrestha (MPA-MC)
William Tumas (SPO-AE)
U.S. Patent 7,713,506

Metal aminoboranes of the formula M(NH2BH3)n have been synthesized. Metal aminoboranes are hydrogen storage materials. Metal aminoboranes are also precursors for synthesizing other metal aminoboranes. Metal aminoboranes can be dehydrogenated to form hydrogen and a reaction product. The reaction product can react with hydrogen to form a hydrogen storage material. Metal aminoboranes can be included in a kit.

Method and Apparatus for Depositing a Coating on a Tape Carrier

Jonathan G. Storer (MPA-STC)
Vladimir Matias (MPA-STC)
U.S. Patent 7,736,438

A system and method for depositing ceramic materials, such as nitrides and oxides, including high temperature superconducting oxides on a tape substrate. The system includes a tape support assembly that comprises a rotatable drum. The rotatable drum supports at least one tape substrate axially disposed on the surface of the drum during the deposition of metals on the tape and subsequent oxidation to form the ceramic materials. The drum is located within a stator having a slot that is axially aligned with the drum. A space exists between the drum and stator. The space is filled with a predetermined partial pressure of a reactive gas. The drum, stator, and space are heated to a predetermined temperature. To form the ceramic material on the tape substrate, the drum is first rotated to align the tape substrate with the slot, and at least one metal is deposited on the substrate. The drum then continues to rotate, bringing the tape substrate into the space, where the metal deposited on the tape substrate reacts with the reactive gas to form the ceramic material. In one embodiment, the tape support system also includes a pay-out/take-up system that co-rotates with the drum and provides a continuous length of tape substrate.

Method for Improving Performance of High Temperature Superconductors Within a Magnetic Field

Haiyan Wang (MPA-CINT)
Stephen R. Foltyn (MPA-STC)
Leonardo Civale (MPA-STC)
Boris Alfredo Maiorov (MPA-STC)
U.S. Patent 7,642,222

The present invention provides articles including a base substrate including a layer of an oriented cubic oxide material having a rock-salt-like structure layer thereon; and, a buffer layer upon the oriented cubic oxide material having a rock-salt-like structure layer, the buffer layer having an outwardly facing surface with a surface morphology including particulate outgrowths of from 10 nm to 500 nm in size at the surface, such particulate outgrowths serving as flux pinning centers whereby the article maintains higher performance within magnetic fields than similar articles without the necessary density of such outgrowths.

Method for the Chemical Separation of Ge-68 from Its Daughter 68Ga

Jonathan Mark Fitzsimmons (C-IIAC)
Robert Whitehill Atcher (SPO-SC)
U.S. Patent 7,728,310

The present invention is directed to a generator apparatus for separating a daughter gallium-68 radioisotope substantially free of impurities from a parent gernanium-68 radioisotope, including a first resin-containing column con-taining parent gernanium-68 radioisotope and daughter gallium-68 radioisotope, a source of first eluent connected to said first resin-containing column for separating daughter gallium-68 radioisotope from the first resin-containing column, said first eluent including citrate whereby the separated gallium is in the form of gallium citrate, a mixing space connected to said first resin-containing column for admixing a source of hydrochloric acid with said separated gallium citrate whereby gallium citrate is converted to gallium tetrachloride, a second resin-containing column for retention of gallium-68 tetrachloride, and, a source of second eluent connected to said second resin-containing column for eluting the daughter gallium-68 radioisotope from said second resin-containing column.

Method of Synthesis of Proton Conducting Materials

Fernando Henry Garzon (MPA-11)
Rangachary Mukundan (MPA-11)
Melinda Lou Einsla (MPA-11)
U.S. Patent 7,736,547

A method of producing a proton conducting material, comprising adding a pyrophosphate salt to a solvent to produce a dissolved pyrophosphate salt; adding an inorganic acid salt to a solvent to produce a dissolved inorganic acid salt; adding the dissolved inorganic acid salt to the dissolved pyrophosphate salt to produce a mixture; substantially evaporating the solvent from the mixture to

produce a precipitate; and calcining the precipitate at a temperature of from about 400oC to about 1200 oC.

Method of Transferring Strained Semiconductor Structures

Michael Anthony Nastasi (MPA-CINT)
Lin Shao (MPA-CINT)
U.S. Patent 7,638,410

The transfer of strained semiconductor layers from one substrate to another substrate involves depositing a multilayer structure on a substrate having surface contaminants. An interface that includes the contaminants is formed in between the deposited layer and the substrate. Hydrogen atoms are introduced into the structure and allowed to diffuse to the interface. Afterward, the deposited multilayer structure is bonded to a second substrate and is separated away at the interface, which results in transferring a multilayer structure from one substrate to the other substrate. The multilayer structure includes at least one strained semiconductor layer and at least one strain-induced seed layer. The strain-induced seed layer can be optionally etched away after the layer transfer.

Multifunctional Nanocrystals

Victor Ivanovich Klimov (C-PCS)
Jennifer Ann Hollingsworth (MPA-CINT)
Scott A. Crooker (MPA-CMMS)
U.S. Patent 7,741,120

Multifunctional nanocomposites are provided including a core of either a magnetic material or an inorganic semiconductor, and, a shell of either a magnetic material or an inorganic semiconductor, wherein the core and the shell are of differing materials, such multifunctional nanocomposites having multifunctional properties including magnetic properties from the magnetic material and optical properties from the inorganic semiconductor material. Various applications of such multifunctional nanocomposites are also provided.

Nanocrystal/Sol-Gel Nanocomposites

Victor Ivanovich Klimov (C-PCS)
Melissa Petruska (C-PCS)
U.S. Patent 7,723,394

The present invention is directed to a process for preparing a solid composite having colloidal nanocrystals dispersed within a sol-gel matrix, the process including admixing colloidal nanocrystals with an amphiphilic polymer including hydrophilic groups selected from the group consisting of -COOH, -OH, -SO3H, -NH2, and -PO3H2 within a solvent to form an alcohol-soluble colloidal nanocrystal-polymer complex, admixing the alcohol-soluble colloidal nanocrys-

tal-polymer complex and a sol-gel precursor material, and, forming the solid composite from the admixture. The present invention is also directed to the resultant solid composites and to the alcohol-soluble colloidal nanocrystal-polymer complexes.

Nanophosphor Composite Scintillator with a Liquid Matrix

Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Rico Emilio Del Sesto (MPA-MC)
Ross Edward Muenchausen (MST-7)
Bryan L. Bennett (MST-7)
Robert David Gilbertson (MST-7)
David Wayne Cooke (MST-8)
Edward Allen Mckigney (N-1)
Minesh Kantilal Bacrania (N-1)
Kevin Curtis Ott (SPO-AE)
U.S. Patent 7,679,060

This material allows for a low-cost spectroscopic gamma-ray detector based on liquid scintillator.

Nanophosphors For Large Area Radiation Detectors

John Cameron Gordon (C-IIAC)
Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Rico Emilio Del Sesto (MPA-MC)
Kevin Curtis Ott (SPO-AE)
U.S. Patent 7,651,633

Nanophosphor compositions were was prepared. The compositions can be used for radiation detection.

Nanostructured Metal - Polyaniline Composites And Applications Thereof

James Arthur Bailey (C-PCS)
Hsing-Lin Wang (C-PCS)
Wenguang Li (C-PCS)
U.S. Patent 7,786,037

Metal-polyaniline (PANI) composites are provided together with a process of preparing such composites by an electrodeless process. The metal of the composite can have nanoscale structural features and the composites can be used in applications such as catalysis for hydrogenation reactions and for analytical detection methods employing SERS.

Near Single-Crystalline, High-Carrier-Mobility Silicon Thin Film on a Polycrystalline/Amorphous Substrate

Quanxi Jia (MPA-CINT)
Paul Nelson Arendt (MPA-STC)
Alp Tugrul Findikoglu (MPA-STC)
Vladimir Matias (MPA-STC)
Woong Choi (MPA-STC)
U.S. Patent 7,608,335

A template article including a base substrate including: (i) a base material selected from the group consisting of polycrystalline substrates and amorphous substrates, and (ii) at least one layer of a differing material upon the surface of the base material; and, a buffer material layer upon the base substrate, the buffer material layer characterized by: (a) low chemical reactivity with the base substrate, (b) stability at temperatures up to at least

about 800oC under low vacuum conditions, and (c) a lattice crystal structure adapted for subsequent deposition of a semiconductor material; is provided, together with a semiconductor article including a base substrate including: (i) a base material selected from the group consisting of polycrystalline substrates and amorphous substrates, and (ii) at least one layer of a differing material upon the surface of the base material; and, a buffer material layer upon the base substrate, the buffer material layer characterized by: (a) low chemical reactivity with the base substrate, (b) stability at temperatures up to at least about 800oC under low vacuum conditions, and (c) a lattice crystal structure adapted for subsequent deposition of a semiconductor material, and, a top-layer of semiconductor material upon the buffer material layer.

Noise Cancellation in Magnetoencephalography and Electroencephalography with Isolated Reference Sensors

Robert Henry Kraus (LDRD-PO)
Michelle A. Espy (P-21)
Andrei Nikolaevich Matlashov (P-21)
Petr Lvovich Volegov (P-21)
U.S. Patent 7,729,740

An apparatus measures electromagnetic signals from a weak signal source. A plurality of primary sensors is placed in functional proximity to the weak signal source with an electromagnetic field isolation surface arranged

adjacent the primary sensors and between the weak signal source and sources of ambient noise. A plurality of reference sensors is placed adjacent the electromagnetic field isolation surface and arranged between the electromagnetic isolation surface and sources of ambient noise.

Non-Contact Pumping of Light Emitters via Non-Radiative Energy Transfer

Victor Ivanovich Klimov (C-PCS)
Marc Willy Achermann (C-PCS)
U.S. Patent 7,642,557

This disclosure addresses a light emitting diode including a layer of quantum dots and the preparation of the same. In one embodiment of the present invention, a CdSe/ZnS core-shell nanocrystalline QD film is deposited onto a substrate of a GaN capping layer upon an InGaN quantum well on a GaN buffer layer on a substrate such as sapphire. Electrical injection is by indirect exciton injection into the quantum dots via non-contact, non-radiative energy transfer from a quantum well that may be pumped either electrically or optically.

Particle Detection Systems and Methods

Christopher Morris (P-25)
Mark F. Makela (P-25)
U.S. Patent 7,714,297

This invention allows the current moun radiography technology to detect neutrons concurrently with charged particles. This would al-

low for a more compact and cost effective detector system to look for nuclear devices and materials at border crossings and ports.

Polymer-Assisted Deposition of Films

Quanxi Jia (MPA-CINT)
Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Yuan Lin (MPA-STC)
U.S. Patent 7,604,839

A polymer assisted deposition process for deposition of metal oxide films and the like is presented. The process includes solutions of one or more metal precursor and soluble polymers having binding properties for the one or more metal precursor. After a coating operation, the resultant coating is heated at high temperatures to yield metal oxide films and the like. Such films can be epitaxial in structure and can be of optical quality. The process can be organic solvent-free.

Preparation And Purification Of Ionic Liquids and Precursors

Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Benjamin Peter Warner (MPA-MC)

U.S. Patent 7,763,186

Substantially pure ionic liquids and ionic liquid precursors were prepared. The substantially pure ionic liquid precursors were used to prepare substantially pure ionic liquids.

Preparation of Graphitic Articles

Martin B. Nemer (ESA-MEE)
Jonathan Phillips (MST-7)
John C. Weigle (W-1)
U.S. Patent 7,713,577

Graphitic structures have been prepared by exposing templates (metal, metal-coated ceramic, graphite, for example) to a gaseous mixture that includes hydrocarbons and oxygen. When the template is metal, subsequent acid treatment removes the metal to yield monoliths, hollow graphitic structures, and other products. The shapes of the coated and hollow graphitic structures mimic the shapes of the templates.

Preparation of Nanostructured Materials Having Improved Ductility

Yuntian Theodore Zhu (MPA-STC)
Yonghao Zhao (MPA-STC)
U.S. Patent 7,699,946

A method for preparing a nanostructured aluminum alloy involves heating an aluminum alloy workpiece at temperature sufficient to produce a single phase coarse grained aluminum alloy, then refining the grain size of the workpiece at a temperature at or below room temperature, and then aging the workpiece to precipitate second phase particles in the nanosized grains of the workpiece that increase the ductility without decreasing the strength of the workpiece.

Protein-Protein Interaction Detection System Using Fluorescent Protein Microdomains

Geoffrey S. Waldo (B-9)
Stephanie Cabantous (B-9)
U.S. Patent 7,666,606

The invention provides a protein labeling and interaction detection system based on engineered fragments of fluorescent and chromophoric proteins that require fused interacting polypeptides to drive the association of the fragments, and further are soluble and stable, and do not change the solubility of polypeptides to which they are fused. In one embodiment, a test protein X is fused to a sixteen amino acid fragment of GFP (b-strand 10, amino acids 198-214), engineered to not perturb fusion protein solubility. A second test protein Y is fused to a sixteen amino acid fragment of GFP (b-strand 11, amino acids 215-230), engineered to not perturb fusion protein solubility. When X and Y interact, they bring the GFP strands into proximity, and are detected by complementation with a third GFP fragment consisting of GFP amino acids 1-198 (strands 1-9). When GFP strands 10 and 11 are held together by interaction of protein X and Y, they spontaneous association with GFP strands 1-9, resulting in structural complementation, folding, and concomitant GFP fluorescence.

Quantitative Method of Determining Beryllium or a Compound Thereof in a Sample

Edel Mary Minogue (C-DO)
Deborah Sue Ehler (MPA-MC)
Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Benjamin Peter Warner (MPA-MC)
Gavin E. Collis (MPA-MC)
Kevin Dale John (SPO-SC)
U.S. Patent 7,781,589

A method of determining beryllium or a berylllium compound thereof in a sample, includes providing a sample suspected of comprising beryllium or a compound thereof, extracting beryllium or a compound thereof from the sample by dissolving in a solution, adding a fluorescent indicator to the solution to thereby bind any beryllium or a compound thereof to the fluoresent indicator, and determining the presence or amount of any beryllium or a compound thereof in the sample by measuring fluorescence.

Radiation Portal Monitor System and Method

William Priedhorsky (LDRD-PO)
Larry Joe Schultz (P-21)
Christopher Morris (P-25)
Gary Elliott Hogan (P-25)
Alexander Saunders (P-25)
Konstantin N. Borozdin (P-25)
Mark F. Makela (P-25)
Jesse Andrew Green (P-25)
Michael James Sossong (P-25)
U.S. Patent 7,633,062

A portal monitoring system has a

cosmic ray charged particle tracker with a plurality of drift cells. The drift cells, which can be for example aluminum drift tubes, can be arranged at least above and below a volume to be scanned to thereby track incoming and outgoing charged particles, such as cosmic ray muons, whilst also detecting gamma rays. The system can selectively detect devices or materials, such as iron, lead, gold and/or tungsten, occupying the volume from multiple scattering of the charged particles passing through the volume and can also detect any radioactive sources occupying the volume from gamma rays emitted therefrom. If necessary, the drift tubes can be sealed to eliminate the need for a gas handling system. The system can be employed to inspect occupied vehicles at border crossings for nuclear threat objects.

Radiofrequency Attenuator and Method

Anthony Keiran Burrell (MPA-MC)
Thomas Mark McCleskey (MPA-MC)
Benjamin Peter Warner (MPA-MC)
Simon Berners Hall (TT)
U.S. Patent 7,615,267

Radiofrequency attenuator and method. The attenuator includes a pair of transparent windows. 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.sub.4.sup.-), hexafluorophosphate (PF.sub.6.sup.-), hexafluoroarsenate

(AsF.sub.6.sup.-), trifluoromethyl-sulfonate (CF.sub.3SO.sub.3.sup.-), bis(trifluoromethylsulfonyl) imide ((CF.sub.3SO.sub.2).sub.2N.sup.-), bis(perfluoroethylsulfonyl) imide ((CF.sub.3CF.sub.2SO.sub.2).sub.2N.sup.-) and tris(trifluoromethylsulfonyl) methide ((CF.sub.3SO.sub.2).sub.3 C.sup.-). Radicals or radical cations may be added to or electrochemically generated in the molten salt to enhance the RF attenuation.

Spin Microscope Based On Optically Detected Magnetic Resonance

Gennady Petrovich Berman (T-4)
Boris Chernobrod (T-4)
U.S. Patents 7,608,820, 7,615,739, and 7,743,648

The invention relates to scanning magnetic microscope which has a photoluminescent nanoprobe implanted in the tip apex of an atomic force microscope (AFM), a scanning tunneling microscope (STM) or a near-field scanning optical microscope (NSOM) and exhibits optically detected magnetic resonance (ODMR) in the vicinity of unpaired electron spins or nuclear magnetic moments in the sample material. The described spin microscope has demonstrated nanoscale lateral resolution and single spin sensitivity for the AFM and STM embodiments.

Suppression of Pyroelectric Excitations with External Magnetic or Electric Fields

Jason Charles Lashley (MST-6)
U.S. Patent 7,687,775

Specific-heat measurements are reported near the Curie temperature (TC=320 K) on tri-glycine sulfate. Measurements were made on crystals whose surfaces were either non-grounded or short-circuited, and were carried out in magnetic fields up to 9 T and electric fields up to 220 V/cm. In non-grounded crystals we find that the shape of the specific-heat anomaly near TC is thermally broadened. However, the anomaly changes to the characteristic sharp l-shape expected for a continuous transition with the application of either a magnetic field or an electric field. In crystals whose surfaces were short-circuited with gold, the characteristic l-shape appeared in the absense of an external field. This effect enabled to determination of the critical exponents above and below TC, and may be understood on the basis that the surface charge originating from the pyroelectric coefficient, dP/dT, behaves as if shorted by external magnetic or electric fields.

Synthesis of [13C] and [2H] Substituted Methacrylic Acid, [13C] and [2H] Substituted Methyl Methacrylate and/or Related Compounds

Clifford Jay Unkefer (B-8)
Marc Anthony Alvarez (B-8)
Rodolfo Antonio Martinez (B-8)
U.S. Patent 7,662,993

The present invention is directed to labeled compounds of the formulae wherein Q is selected from the group consisting of -S-, -S(=O)-, and -S(=O)2-, Z is selected from the group consisting of 1-naphthyl, substituted 1-naphthyl, 2-naphthyl, substituted 2-naphthyl, and phenyl groups with the structure wherein R1, R2, R3, R4 and R5 are each independently selected from the group consisting of hydrogen, a C1-C4 lower alkyl, a halogen, and an amino group selected from the group consisting of NH2, NHR and NRR' where R and R' are each independently selected from the group consisting of a C1-C4 lower alkyl, an aryl, and an alkoxy group, and X is selected from the group consisting of hydrogen, a C1-C4 lower alkyl group, and a fully-deuterated C1-C4 lower alkyl group. The present invention is also directed to a process of preparing labeled compounds, e.g., process of preparing [13C]methacrylic acid by reacting a (CH3CH2O-13C(O)-13CH2)- aryl sulfone precursor with 13CHI to form a (CH3CH2O-13C(O)-13C(13CH3)2)- aryl sulfone intermediate, and, reacting the (CH3CH2O-13C(O)-13C(13CH3)2)- aryl sulfone intermediate with sodium hydroxide, followed by

acid to form [13C]methacrylic acid. The present invention is further directed to a process of preparing [2H8]methyl methacrylate by reacting a (HOOC-C(C2H3)2 - aryl sulfinyl intermediate with CD3I to form a (2H3COOC-C(C2H 3)2) - aryl sulfinyl intermediate, and heating the(2H3COOC-C(C2H 3)2) - aryl sulfinyl intermediate at temperatures and for time sufficient to form [2H8]methyl methacrylate.

System and Method that Suppresses Intensity Fluctuations for Free Space High-Speed Optical Communication

Alan Bishop (ADTSC)
Dinh Cong Nguyen (ISR-6)
Gennady Petrovich Berman (T-4)
Boris Chernobrod (T-4)

U.S. Patent 7,603,038

A high-speed (Gbps), free space optical communication system is based on spectral encoding of radiation from a wide band light source, such as a laser. By using partially coherent laser beams in combination with a relatively slow photosensor, scintillations can be suppressed by orders of magnitude for distances of more than 10 km. To suppress the intensity fluctuations due to atmospheric turbulence, a source with partial transverse coherence in combination with slow response time photodetector is used. Information is encoded in the spectral domain of a wideband optical source by modulation of spectral amplitudes. A non-coherent light source

with wide spectrum (an LED, for example) may be used for high-speed communication over short (less than about a mile) distances.

System for Treating Produced Water

Enid Joan Sullivan (C-CDE)
U.S. Patent 7,767,078

Our system is designed to remove all organic compounds, including difficult-to remove organic acids, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) from oil and gas produced waters or other contaminated water streams. A two-step process utilizing a sorbent material and stripping process removes VOCs and SVOCs, and a second step removes organic acids and other organic compounds, in preparation for standard RO or other salinity removal processes.

Thermally Stable Compositions Including,4,8,10-Tetranitro-5H-Pyrido[3',2':4,5] [1,2,3] Triazolo[1,2-A]Benzotriazol-6-Ium, Inner Salt

My Hang Vo Huynh (WEPEXP-7)
U.S. Patent 7,651,577

An explosive formulation including 2,4,8,10-tetranitro-5H-pyrido[3',2':4,5][1,2,3]triazolo[1,2-a] benzotriazol-6-ium, inner salt and a high temperature binder is disclosed together with a process of preparing 2,4,8,10-tetranitro-5H-pyrido[3',2':4,5][1,2,3]triazolo[1,2-a]benzotriazol-6-ium, inner salt.

Ultra-Low Field Nuclear Magnetic Resonance and Magnetic Resonance Imaging to Discriminate and Identify Materials

Robert Henry Kraus (LDRD-PO)
Michelle A. Espy (P-21)
Andrei Nikolaevich Matlashov (P-21)
Petr Lvovich Volegov (P-21)
U.S. Patent 7,688,069

An ultra-low magnetic field NMR system can non-invasively examine containers. Database matching techniques can then identify hazardous materials within the containers. Ultra-low field NMR systems are ideal for this purpose because they do not require large powerful magnets and because they can examine materials enclosed in conductive shells such as lead shells. The NMR examination technique can be combined with ultra-low field NMR imaging, where an NMR image is obtained and analyzed to identify target volumes. Spatial sensitivity encoding can also be used to identify target volumes. After the target volumes are identified the NMR measurement technique can be used to identify their contents.

Copyrights Asserted in Fiscal Year 2010

Cell Power Toys, Version 1.0

Scott D. Pakin (CCS-7)

The cell powertoys is a collection of small utilities that make it easier to develop software for the Cell Broadband Engine, which many people recognize as the microprocessor in the Playstation 3. Each Cell contains eight high-speed vector processors called synergistic processing elements (SPEs).

CINDER 2008

William Bradley Wilson (EES-12)
Shannon Tracy Holloway (T-2)
Hannah Currier Little (T-2)

CINDER 2008 is the latest adaptation of the LANL legacy code, CINDER. Commonly referred to as a nuclear transmutation code, CINDER predicts temporal nuclear inventories in environments such as reactors and accelerators. The CINDER software package includes an extensive nuclear data library, the CINDER algorithm based on Markovian chains, and two post-processing codes designed to make results user-friendly.

cmdVista, Version 0.82

Lakshman Prasad (ISR-2)
Sriram Swaminarayan (CCS-7)

cmdVista is a code for generalized object extraction and agglomeration from raster images. It first converts the raster images to a vector image using the VISTA procedure. It then progressively agglomerates polygons to extract higher order features in a hierarchical manner.

CO2-PENS, Version 2009

James William Carey (EES-14)
Bruce C. Letellier (D-5)
Hari S. Viswanathan (EES-16)
Dean Lawrence Sanzo (D-5)
Philip H. Stauffer (EES-16)
Gordon Neal Keating (EES-16)
Rajesh J. Pawar (EES-16)
Shaoping Chu (EES-16)

CO2-PENS is a coupled system-process level model aimed at analysis of long-term performance of an integrated geologic CO2 sequestration operation. CO2-PENS can be used to track movement of CO2 from sources such as coal fired power plants, into geologic storage reservoirs. It can be used to understand the impact of long-term storage of CO2 on the reservoir including potential release due to any failure. In such scenario, CO2-Pens can be used to calculate physical processes either using analytical expressions or numerical solutions.

FastGamma

Robert Jerome Estep (N-2)
Sean M. Brennan (ISR-3)

FastGamma is software that simulates radiological source detection. It models detectors, isotopes, attenuators, and obstructions, and space and time varying background activity. FastGamma uses the multiple isotope material basis set (MIMBS) model to rapidly simulate attenuated gamma-ray spectra in a collection of moving detector

objects from a collection of moving source objects located in a three-dimensional virtual landscape. It produces spectrum simulations with the realism of time-intensive modeling codes such as MCNPX in orders of magnitude less computational time (fractions of a ms for Nal spectra) using a compact analytical function library. Any type or size of non-directional gamma ray detector that can be modeled with simulations codes such as MCNPX or GADRAS can be modeled by FastGamma. Similarly, any source spectrum that can be modeled with those codes can also be modeled by this software. FastGamma was developed for the Raytheon SWARM projects to evaluate search strategies for detecting, discriminating and locating threat sources in urban environments.

General Mesh Viewer (GMV), Version 4.5

Frank Anthony Ortega (XCP-1)

General Mesh Viewer (GMV) is an easy to use scientific visualization tool that can process data from 2-D or 3-D mesh. It reads data from an input file and interactively displays selected information on the screen.

GeoMatTool, Version 1.0

Doran Robert Greening (EES-17)

GeoMatTool support the estimation of parameter values for certain models of use in geomechanics modeling and simulation. The tool itself is a Java language script that

functions principally as a database manager for data from certain geomechanical tests. The tool as a database manager allows the user to access, review and modify in limited ways the data. The tool then serves as an interface to plotting and statistical software packages to facilitate the evaluation of the data and parameter estimation.

Gilgamesh, Version 0.1

Nathan A. Debardeleben (HPC-1)
Clayton Fewell Chandler (HPC-5)

Gilgamesh is a custom plug-in for SGI's/Krell's Open|SpeedShop performance monitoring framework. It uses dynamic binary instrumentation to efficiently retrieve resilience-pertinent information from a running HPC application. Currently, Gilgamesh is extremely alpha quality with mostly stubs and instrumentation hooks. Once complete, it will use the information gathered from many data sources to make a decision about the health of an HPC system and utilize an expert system to modify the behavior of a running application.

HIGRAD/FIRETEC 2009

Eunmo Koo (EES-16)
Rodman Ray Linn (EES-16)
Judith Winterkamp White (EES-16)
William Scott Smith (EES-16)
Jon Michael Reisner (EES-16)
Jesse M. Canfield (EES-16)
Jeremy A. Sauer (EES-16)

HIGRAD/FIRETEC is the first physics-based, three-dimensional (3-D) computer code designed to simulate the constantly changing, interactive relationship between fire and its environment. It does so by representing the coupled interaction between fire, fuels, atmosphere, and topography on a landscape scale (hundreds or thousands of meters). HIGRAD/FIRETEC combines physics models that represent combustion, heat transfer, aerodynamic drag, and turbulence with a computational fluid-dynamics model that represents airflow and its adjustments to terrain, different types of fuel (vegetation), and the fire itself. Unlike the empirically based models currently used in the field, HIIGRAD/FIRETEC simulates the dynamic processes that occur within a fire and the way those processes feed off and alter each other. HIGRAD/FIRETEC also include a Lagrangian Transport capability which is used to track the transport of lofted burning material (fire brands) that can start fires in other locations.

Image Alignment, Version 3.0

Larry Jonathan Dowell (D-3)

When video is captured from a moving vehicle, such as an aircraft or a car driving down a bumpy road, large amounts of jitter are introduced. Whether the application is displaying in real time a high-pursuit police chase on the 10:00 news, or capturing video, analyzing it, and telling warfighters on the ground what's around the corner, stabilization of jitter created in the video data is essential. The current solution for removing camera jitter requires the use of costly camera gimbals (stabilization devices), which don't always offer a com¬plete solution. The Image Alignment, Version 3.0 package is an inno¬vative software solution for image alignment to correct camera jitter. Using this software tool, video data can be captured with a camera mounted on a low-end gimbal (~$20,000 or less) allowing the jitter to be removed on the fly in real time as the image is processed and displayed to the viewer. The software uses a unique algorithm to identify common features in frames for frame-to-frame image registration. This algorithm can correct large frame-to-frame image translations, correcting pixel translations by as much as 75% of an image diagonal. The algorithm works for large and small images, demon¬strated in practice with images as large as 11 Megapixels.

Integrated Knowledge Engine (IKE), Version 2.x

Edward Mathias Van Eeckhout (D-6)
Deborah Ann Leishman (D-6)
William Loane Gibson (D-6)

Integrated Knowledge Engine (IKE) is an enhanced Bayesian analysis tool for monitoring and surveillance. The enhancements are suited for rapid response situations where decisions must be made based on uncertain and incomplete evidence from many diverse and heterogeneous sources. The enhancements extend the probabilistic results of the traditional Bayesian analysis by (1) better quantifying uncertainty arising from model parameter uncertainty and uncertain evidence, (2) optimizing the collection of evidence to reach conclusions more quickly, and (3) allowing the analyst to determine the influence of the remaining evidence that cannot be obtained in the time allowed. These extended features give the analyst and decision maker a better comprehension of the adequacy of the acquired evidence and hence the quality of the hurried decisions.

KIVA-3V, Version 2

Anthony A. Amsden (T-03)
Peter J. O'rourke (T-03)

KIVA 3V RELEASE 2 is a computer program for the numerical calculation of transient, two and three-dimensional, chemically reactive flows with sprays. It is a newer version of the earlier KIVA3 (1993)

that has now been extended to model vertical of canted valves in the cylinder head of a gasoline or diesel engine. KIVA3, in turn, was based on the earlier KIVA2 (1989) and uses the same numerical solution procedure and solves the same sort of equations. KIVA3VRELEASE2 uses a block-structured mesh with connectivity defined through indirect addressing. The departure from a single rectangular structure in logical space allows complex geometries to be modeled with significantly greater efficiency because large regions of deactivated cells are no longer necessary.

KIVA-4

David John Torres (T-03)
David Bradley Carrington (T-3)

KIVA-4 is the latest version of the series of KIVA codes. While KIVA-4 maintains the full generality of KIVA-3V, it adds the capability of computing with unstructured grids. Unstructured grids can be generated more easily than structured grids for complex geometries. The unstructured grids can be composed of a variety of elements including hexahedra, prisms, pyramids, and tetrahedral. However the numerical accuracy is less when the grid is not composed of hexahedra. KIVA-4 was developed to work with the many geometries accommodated with KIVA-3V which include 2D axisymmetric, 2D planar, 3D axisymmetric sector geometries, and full 3D geometries. KIVA-4 also features a multi-component fuel evaporation algorithm.

KIVA-4mpi

David John Torres (T-03)
David Bradley Carrington (T-03)

KIVA-4mpi is the parallel version of KIVA-4, a software/computer code for solving chemically reacting multi-phase viscous Navier-Stokes equations and is particularly designed for the solution of the physics in an internal combustion engine. KIVA-4mpi capabilities include multi-phase reactive flow and in particular combustion modeling for engines which is based on the KIVA-4 unstructured software.

LAMG, Version 1.8.1

Michael L. Hall (CCS-2)
Wayne David Joubert (CCS-2)
Bryan Richard Lally (CCS-7)
John David Moulton (T-5)

The LAMG package is a library of subroutines for solving systems of linear equations on parallel computers using algebraic multigrid methods. It is suitable for solving sparse systems of linear equations which arise from computer simulation of physical phenomena. LAMG implements a variety of algebraic multigrid algorithms which are capable of scaling to tens of thousands of processors on distributed memory supercomputer platforms.

Linux Noise Detective, Version 1.0

Hugh N. Greenberg (HPC-5)
Latchesar Alexandrov Ionkov (HPC-5)

Linux Noise Detective is comprised of a Linux kernel module and several python scripts. The kernel module collects data from a running kernel that contains information about the processes running. The python scripts analyze this data and present it to the user in graph form.

List Mode Tomography from Muon Shadows (LMT4LUIS), Version 1.0

Andrew Mcleod Fraser (ISR-2)

LMT4LUIS implements a procedure for estimating the difference between a nominal density profile and an unknown target density profile. The procedure uses detected cosmic ray muons that have passed through the unknown density as its source of information. It uses background runs to characterize relevant features of the incident flux, detector efficiency and the nominal profile simultaneously.

LoPSideD, Version 0.x -- An Implementation of the Linked Process Protocol Specification

Marko A. Rodriguez (T-5)

The LANL-based Linked Process project takes a new approach to Internet-scale distributed computing. While existing large-scale grid computing projects are typically

very constrained in the kinds of computational tasks which can be performed, the kinds of devices which can participate in computation, and in the overall architecture of the system, the Linked Process specification provides the foundation for a much larger and more general-purpose distributed computing platform. Any device supporting the Extensible Messaging and Presence Protocol (XMPP), be it a supercomputer or a cellular phone, is a potential node in a global compute cloud, communicating with other nodes in a manner similar to human chat.

MCNP5, Version 1.50

Robert Arthur Forster III (XCP-3)
Thomas E. Booth (XCP-4)
H. Grady Hughes (XCP-3)
Richard E. Prael (XCP-3)
Jeffrey S. Bull (XCP-3)
John Timothy Goorley (XCP-3)
Avneet Sood (XCP-7)
Forrest B. Brown (XCP-3)
Jeremy Ed Sweezy (XCP-3)
Anthony J. Zukaitis (XCP-3)
Roger Lee Martz (XCP-3)

MCNP is a general-purpose Monte Carlo N-Particle code that can be used for neutron, photon, electron, or coupled neutron/photon/electron transport, including the capability to calculate eigenvalues for critical systems. The code treats an arbitrary three-dimensional configuration of materials in geometric cells bounded by first- and second-degree surfaces and fourth-degree elliptical tori. Pointwise cross-section data are used. For neutrons, all reactions given in a particular

cross-section evaluation (such as ENDF/B-VI) are accounted for. Thermal neutrons are described by both the free gas and S(alpha,beta) models. For photons, the code accounts for incoherent and coherent scattering, the possibility of fluorescent emission after photoelectric absorption, and absorption in electronpositron pair production. Electron/positron transport processes account for angular deflection through multiple Coulomb scattering, collision energy loss with optional straggling, and the production of secondary particles including K x-rays, knock-on and Auger electrons, bremsstrahlung, and annihilation gamma rays from positron annihilation at rest. Electron transport does not include the effects of external or self-induced electromagnetic fields. Photonuclear physics is available for a limited number of isotopes. Important standard features that make MCNP very versatile and easy to use include a powerful general source, criticality source, and surface source; both geometry and output tally plotters; a rich collection of variance reduction techniques; a flexible tally structure; and an extensive collection of cross-sectional data.

Method for High Through-put Ultrasonic Flow-Field Fractionation Schematics

Greg Russ Goddard (B-9)
David Lawrence Hill (B-9)

Schematics for an acoustic standing wave(s) separates and locally concentrates particles based on their thermophysical properties for fractionation purposes in larger volumes through the use of unique flow-through geometry.

mFUSE: Function Sequencer for MATLAB, Version 0.1.00

Gyu Hae Park (INST-OFF)
Charles Reed Farrar (INST-OFF)

mFUSE: Function Sequencer for MATLAB is a Java-based graphical user interface (GUI) for use with MATLAB. mFUSE facilitates the development of analytical processes by allowing users to quickly and intuitively connect MATLAB functions as steps in a sequence. Originally developed for use with a package of modular functions for Structural Health Monitoring, mFUSE provides researcher a means to quickly develop and compare analytical processes for any application. mFuse features a modern graphical display, drag-and-drop support, advanced m-file parsing, numerous saving options, and reconfigurable function library.

Nuclear Data Interface (NDI), Version 2.x

Joann Marie Campbell (XCP-2)
Mark Girard Gray (XCP-5)
Morgan Curtis White (XCP-5)

The Nuclear Data Interface (NDI) provides an Application Programming Interface (API) layer between codes that need access to nuclear data and the data as stored on file. These data may include fundamental nuclear constants, multigroup transport data, production-depletion chain information, thermonuclear reaction rates, or other nuclear data parameters. The separation of calling code from data storage allows changes to data formats, update of data files and access on different platforms to be done without changes to the calling code itself. This has been an important step in greatly consolidating the number of file formats used to store nuclear data for LANL simulation codes and in improving the consistency between codes that use these data.

ORCAS Mechanical Design Package and CAD Files

Steven Paul Love (ISR-2)
Thomas Chatters Hale (ISR-2)

The Optimized Remote Chemical Analysis Spectrometer (ORCAS) is a compact hyperspectral imager for the long-wave infrared (LWIR) spectral region. ORCAS is a grating-based instrument incorporating aspheric refractive optics to achieve a palm-sized optics package measuring approximately 3.5 in. x 3.5 in. x 1.5 in. while

keeping geometric distortions (smile, keystone, etc.) to near-negligible levels. With its current focal plane array (FPA), a 256x256 pixel HgCdTe array with 40-micron pixel pitch, ORCAS covers the 7.6 - 13.5 micron spectral range in 256 spectral bands, with a spatial field of view of approximately 7 degrees. The ORCAS Mechanical Design Package includes all the design files in various CAD programs.

ORCAS Optical Design Package

Steven Paul Love (ISR-2)
Thomas Chatters Hale (ISR-2)

The Optimized Remote Chemical Analysis Spectrometer (ORCAS) is a compact hyperspectral imager for the long-wave infrared (LWIR) spectral region. ORCAS is a grating-based instrument incorporating aspheric refractive optics to achieve a palm-sized optics package measuring approximately 3.5 in. x 3.5 in. x 1.5 in. while keeping geometric distortions (smile, keystone, etc.) to near-negligible levels. With its current focal plane array (FPA), a 256x256 pixel HgCdTe array with 40-micron pixel pitch, ORCAS covers the 7.6 - 13.5 micron spectral range in 256 spectral bands, with a spatial field of view of approximately 7 degrees. The ORCAS Optical Design Package includes all the optical design files written in ZEMAX.

PFLOTRAN, Version 2.0

John David Moulton (T-5)
Bobby Philip (T-5)
Peter C. Lichtner (EES-16)

PFLOTRAN is a massively parallel, multiphase, multicomponent, reactive flow and transport code for modeling subsurface processes. Parallelization is based on domain decomposition achieved through the use of the PETSc parallel libraries (Portable Extensible Toolkit for Scientific Computing developed at Argonne National Laboratory (ANL)). PFLOTRAN is being used to model CO2 sequestration, plutonium migration at the Nevada Test Site, uranium migration at the Hanford 300 Area DOE facility, and many other applications to groundwater contaminant migration under partially saturated, nonisothermal conditions.

Phase and Radial Motion in a Transverse Electric Quadrupole (PARMTEQM), Version 3.0

Lloyd Martin Young (ISR-6)
James Harold Billen (LANSCE-ABS)
Kenneth Roy Crandall (LANSCE-ABS)
Dale Leonard Schrage (LANSCE-ABS)

PARMTEQM and several other RFQ design codes comprise this group of codes and are used to design high-performance radio-frequency quadrupole (RFQ) linacs. The codes have been experimentally verified in some detail by beta users at LANL and other laboratories. As we learn more about linac performance, both experimentally and theoretically, we continue to update these codes. Partial and complete RFQ design-code distributions are available. PARMTEQ and its support codes make up the partial distribution containing the codes necessary to design the RFQ vane profile and analyze the beam performance including the effects of higher order multipole field components and image charges. PARMTEQM is the complete distribution of the codes plus the code VANES and several related programs, which generate and analyze machine instructions for numerically controlled machining of the vanes. Multi-particle simulations of the RFQ design are also possible with these codes.

Physics-based Integrated Model for Sensors (PIMS), Version 9.0

Roger Ronald Petrin (ISR-3)
Keri Ann Ramsey Goorley (ISR-3)

Physics-based Integrated Model for Sensors (PIMS) is a Java-based software tool for investigating and exploring hyperspectral imaging sensor performance. PIMS models passive hyperspectral imaging systems based on dispersive spectrometers operating in the mid-wave (1800-4400 cm-1 or 2.273-5.555 ?m) and long-wave (700-1400 cm-1 or 7.143-14.286 ?m) infrared spectral regions (MWIR and LWIR respectively), using spectral data at 0.1cm-1 sampling. PIMS is a tool to either perform trade studies (evaluate the effects

of system parameter variations such as changing slit width) or analyze system performance throughout the design and use of such sensors. It may also be useful in explaining anomalous data encountered during sensor operation. PIMS is a system-level model that simulates both acquisition of hyperspectral data and its exploitation. Using PIMS, systems can be evaluated using criteria based on their chemical effluent detection, identification and quantification capability, not only their noise equivalent signal radiance. Chemical effluent sensing performance can be quantified as a function of system design characteristics, environmental characteristics, source characteristics and analysis technique.

POSTMAX, Version 2.0

Bruce C. Letellier (D-5)
Raymond Francis Sartor (SB-TS)

POSTMAX is a small program developed to statistically analyze MACCS2 output to determine a 95th percentile value for atmospheric dispersion (x/Q) as a function of weather data and site boundary distance.

Puppet - v Rowlf & Statler releases

Roy S. Nielsen (DCS-1)

Puppet is a configuration management tool that is being used to automate installation of packages, run custom scripts, set configuration and security posture and

inventory properties of *nix-based computers from a central server or servers. This includes but is not limited to Macs, Solaris, Redhat, Ubuntu, FreeBSD and other *nix systems. LANL is currently using Puppet to centrally manager and inventory Macintosh computers and may migrate to other Linux and Unix systems.

Rapid Automated Decomposition of Images for Ubiquitous Sensing (RADIUS), Version 2.0

Scott Edward Dillard (ISR-2)

This software contains a C++ library and executables for performing image segmentation and polygonization. The primary functionality of the software is as follows: images are provided to the software in a raster format (JPEG, PNG, or TIFF file formats). Pixels are identified which are likely to lie on the boundaries of the objects and regions depicted in the image. A Delaunay triangulation of these pixels is constructed. Polygons are constructed from the edges of the triangulation. Finally, polygons are merged in a hierarchical way to form multiple image segmentations at varying levels of detail. The output of the software is a binary file containing image segmentation information. A separate executable is included to view the contents of these files.

Raster to Vector Graphics for Image Data (RaveGrid), Version 2.5

Lakshman Prasad (ISR-2)
Sriram Swaminarayan (CCS-7)

RaveGrid is software for converting raster bitmap images to scalable vector images in SVG (Scalable Vector Graphics) or EPS (Encapsulated Postscript) formats. RaveGrid is software that efficiently converts a raster image comprised of pixels to a scalable vector image comprised of polygons of varying shapes and sizes whose boundaries conform to the edges in the image at any desired resolution.

RaveFont, Version 1.0

Lakshman Prasad (ISR-2)
Sriram Swaminarayan (CCS-7)

raveFont is a code designed to help users identify font glyphs using cmdVista as the backend. The user drags-and-drops single glyphs (characters) into the input area and specifies the glyph they are trying to identify. raveFont then vectorizes the code using cmdVista and displays the result in the output window. It then compares the vectorized output with the system fonts and identifies the system fonts that most closely match the glyphs that were input.

SE, Version 1.0

Gabriel M. Rockefeller (CCS-2)
Steven Diehl (T-2)

SE is a data-handling library that provides a simple wrapper and interface to the HDF5 library for data storage and manipulation. The SE library provides simple C and Fortran interfaces for opening HDF5 files and for reading and writing either simple arrays or arrays of data structures. The underlying data format and layout and implemented by SE are appropriate for stellar evolution codes and nucleosynthesis post-processing tools.

Shale Module, Version 1.x

Doran Robert Greening (EES-17)
Charlotte Anne Rowe (EES-17)

The software designated 'Shale Module' is an implementation of an oil shale specific material model as an ABAQUS user model. The implementation consists of a number of FORTRAN 90 modules to evaluate the stress state of a material given the relevant strain, temperature, and other states. The package consists of oil shale specific models and ancillary modules for vector, tensor and eigenvalue/eigenvector capabilities of particular interest for mechanics.

SHMTools, Version 0.1

Gyu Hae Park (INST-OFF)
Charles Reed Farrar (INST-OFF)

SHMtools is a MATLAB package that facilitates the construction of structural health monitoring (SHM) processes. It is the beginning of a larger effort to collect and archive proven approaches to SHM fore re-use by the research community. The package provides a set of functions organized into modules according to the three primary stages of Structural Health Monitoring: Data Acquisition, Feature Extraction, and Feature Classification. A modular function design and a set of standardized parameter formats make it easy to assemble and test customized SHM processes. The package therefore includes various algorithms with source codes, along with structural data to serve as benchmarks for the evaluation of algorithms. A subset of the software in SHMtools is embeddable, which consists of Matlab functions that can be cross-compiled into generic 'C' programs to be run on a target hardware.

STEM Education CRADA, Phase 1 April 2009: Video Interviews with Philip Jones, Kurt Sickafus, Holly Trellue, Dean Peterson, Paul Langan, Julianna Fessenden, Melissa Fox, and Scott Twary

Steven F. Stringer (TT-DO)

The materials are digital video/audio interviews with LANL scientific staff. The staff members, their topical subjects, and the dates of the different Phases of this project during which the interviews were conducted are summarized below. Each video is approximately one (1) hour long, and captures the interview done between an employee of the CRADA participant (the interviewer) and a Laboratory staff members from IRM-RMMSO operated the video recording equipment (John Bass and Warren Young). Phase 1, Spring 2009 1. Climate Modeling: Phil Jones 2. Nuclear Power: Kurt Sickafus, Holly Trellue 3. High Temperature Superconductivity: Dean Peterson 4. Cellulosic Bioethanol: Paul Langan 5. Carbon Sequestration: Julianna Fessenden, Melissa Fox 6. Algae Biodiesel: Scott Twary

STEM Education CRADA, Phase 2 October 2009: Video Interviews with Milan Sykora, Jennifer Hollingsworth, Marilyn Hawley, Michael Caffrey, and Tommy Rockward

Steven F. Stringer (TT-DO)

The materials are digital video/audio interviews with LANL scientific staff. The staff members, their topical subjects, and the dates of the different Phases of this project during which the interviews were conducted are summarized below. Each video is approximately one (1) hour long, and captures the interview done between an employee of the CRADA participant (the interviewer) and a Laboratory staff members from IRM-RMMSO operated the video recording equipment (John Bass and Warren Young). Phase 2, Fall 2009 1. Artificial Photosynthesis: Milan Sykora 2. Nanomaterials: Jennifer Hollingsworth 3. Polymer Study: Marilyn Hawley 4. Alloys

and Composite Materials, and Cubesats: Michael Caffrey 5. Fuel Cells: Tommy Rockward

STEM Education CRADA, Phase 3 February 2010: Video Interviews with Patrick Chain, Cheryl Gleasner, Greg Goddard, Lance Green, Bill Lipscomb, Sebastian Mernild, Jose Olivares, and Steve Stringer

Steven F. Stringer (TT-DO)

The materials are digital video/audio interviews with LANL scientific staff. The staff members, their topical subjects, and the dates of the different Phases of this project during which the interviews were conducted are summarized below. Each video is approximately one (1) hour long, and captures the interview done between an employee of the CRADA participant (the interviewer) and a Laboratory staff members from IRM-RMMSO operated the video recording equipment (John Bass and Warren Young). Phase 3, Winter 2010 1. Algae/Lipid Extraction: Greg Goddard 2. NNDS Collaboration Commentary: Jose Olivares 3. Genome Sequencing: Patrick Chain, Lance Green, Cheryl Gleasner 4. Copenhagen/Ice Melt: Sebastian Mernild 5. NNDS Collaboration Background: Steve Stringer 6. Modeling Sea Level Rise: Bill Lipscomb 7. Paleoclimatology: Jeff Heikoop

Visual Crosswalk Analysis Tool (VCAT), Version 2.0

Perry Clayton Gray (GS-PO)
John Joseph Ambrosiano (D-4)
Timothy James Cleland (D-6)

VCAT is a knowledge modeling and analysis tool. It was synthesized from functional analysis, business process modeling, and complex network science. VCAT discovers synergies by analyzing natural language descriptions. Specifically, it creates visual analytic perspectives that capture intended organizational structures then overlays the serendipitous relationships that point to potential synergies within an organization or across multiple organizations. All organizations struggle to understand the relationships among projects in their portfolios and synergies that may link their interests with those of customers or other organizations. Org charts, enterprise workflows and other standard business representations show only the intended relationships and miss the rest. Social networking and data mining tools only show ad hoc relationships and ignore the business plan. VCAT was developed by LANL as a broad innovation capability for all large organizations that endeavor to understand their own resource utilization and potential for collaboration. The VCAT activity-centric data model is flexible enough to encompass ent3erprise relationships across any set of organizational units. Linkage analysis can reveal quantitative interdependencies relating

resources, products, people, controls and outcomes.

Zenoss, Version 2.1.3

Adrian E. Romero (HPC-1)
Samuel Sanchez (HPC-1)

The HPC monitoring project goal was to extend upon the Zenoss core produce to provide large scale system monitoring, data collection and reporting, and root cause isolation for high-performance computers and isolated infrastructure.

Fiscal Year 2010 Active License Participants

Marc Anthony Alvarez (B-8)
The production of chemicals that incorporate stable isotopes.

Penelope S. Anderson (B-8)
Los Alamos Plant Growth and Yield Improvement

Paul Nelson Arendt (MPA-STC)
Superconductivity Technology CNT Portfolio for Structural Applications

Jeffrey M. Audia (N-4)
MiniGRAND Family of Instruments

Scott N. Backhaus (MPA-CMMS)
Pulse Tube Refrigerator with Variable Phase Shift and Traveling Wave Device with Mass Flux Suppression

Ying Bai (ISR-5)
MiniGRAND Family of Instruments Advanced Multiplicity Shift Register (AMSR)

Marcie Rochelle Black (IAT-1)
Increased Energy Conversion via Incorporation of an Intermediate Bandgap

Craig Blackhart (AET-5)
Apparatus and Method For Handheld Sampling

Johan Lambert Trudo Maria Bollen (STB-RL)
Blackbox Version 1.0

Konstantin N. Borozdin (P-25)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Terrence F. Bott (D-6)
LED Tree v.1.0

Steven C. Bourret (N-1)
MiniGRAND Family of Instruments Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting for Use with SuperHENC Advanced Multiplicity Shift Register (AMSR)

Jeffrey Richard Bowles (ISR-6)
Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1

Andrew M. Bradbury (B-9)
Plasmids and Bacterialphage Packaging Cell Line for Phage Display GFP for flow cytometry kits

Jonathan N. Bradley (CIC-3)
MultiResolution Seamless Image Compression Invention and Software (MRSID)

Scott Douglas Briles (ISR-3)
INFICOMM

Lawrence Eugene Bronisz (IAT-2)
Superconductivity Technology

Donald Weber Brown (EES-17)
Down Hole Sealing Method (Ceramicrete) -- RSA Geothermal Energy Production with Supercritical Fluids

Steven Patrick Brumby (ISR-2)
Genie Pro, Version 2.0

Glenn S. Brunson, Jr. (N-2)
Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1

Anthony Keiran Burrell (MPA-MC)
Method for Detecting Binding Constants Using Micro X-Ray Fluores-

cence (MXRF)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample
Polymer-Assisted Deposition of Metal Oxides and Nitrides

Deanna Nicole Busick (MST-11)
Composite Bipolar Plates for Electro-chemical Cells

Stephanie Cabantous (B-2)
LANL GFP Portfolio
GFP for flow cytometry kits

Michael Paul Caffrey (ISR-3)
Adaptive Software Radio

James William Carey (EES-14)
Detection of Alkali-sillica Reaction in Concrete

David Bradley Carrington (T-3)
KIVA-4mpi.beta
KIVA-4mpi, Version 0
KIVA-4mpi

David E. Chavez (WEPEXP-7)
BTATz

David D. Clark (P-24)
INFICOMM

Don Mayo Coates (TT-DO)
INFICOMM

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

Michael Loren Collins (N-4)
K-Edge Hybrid Densitometer Software

Gavin E. Collis (C-SIC)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Paul John Contreras (MST-16)
Passive Glovebox Leak Detector

James Yates Coulter (MPA-STC)
Superconductivity Technology

Michael Edward Cournoyer (TA55-OPS)
Passive Glovebox Leak Detector

Raymond F. Depaula (MPA-STC)
Superconductivity Technology
CNT Portfolio for Structural Applications

Judith Louise Driscoll (MPA-STC)
Superconductivity Technology

Damian R. Eads (ISR-2)
Genie Pro, Version 2.0

Kimberley Marie Edlund (ISR-3)
Genie Pro, Version 2.0

Deborah Sue Ehler (C-SIC)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Stephen Ward Eisenhawer (D-6)
LED Tree v.1.0

Diana M. Esch-Mosher (ISR-3)
Genie Pro, Version 2.0

Robert Jerome Estep (N-2)
Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1
TGS-FIT/TGS-MAT

Wu-chun Feng (N-1)
EnergyFit

Stephen R. Foltyn (MPA-STC)
Superconductivity Technology

Andrew Mcleod Fraser (ISR-2)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Samuel M. Freund (LC-IP)
INFICOMM

Mark C. Galassi (ISR-1)
Genie Pro, Version 2.0

David Lee Gardner (MPA-CMMS)
Pulse Tube Refrigerator withVariable Phase Shift and Traveling Wave Device with Mass Flux Suppression

Seth Sheer Gleiman (WT-6)
Method for producing ceramic particles agglomerates
Spherical boron nitride particles and method for preparing them

Greg Russ Goddard (C-IIAC)
Low-Cost Portable Flow Cytometry

Roy Michael Goeller (ISR-4)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Keri Ann Ramsey Goorley (ISR-SDS)
PIMS, Version 9.0

Karen Michelle Grace (ISR-4)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Wynne Kevin Grace (C-PCS)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Steven Wayde Graves (B-9)
Low-Cost Portable Flow Cytometry

Jesse Andrew Green (P-25)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

James Randal Groves (MPA-STC)
Superconductivity Technology CNT Portfolio for Structural Applications

George Drake Guthrie (EES-DO)
Detection of Alkali-sillica Reaction in Concrete

Robert Clayton Habbersett (B-2)
Low-Cost Portable Flow Cytometry

James K. Halbig (N-1)
MiniGRAND Family of Instruments Advanced Multiplicity Shift Register (AMSR)

Thomas Chatters Hale (ISR-2)
ORCAS (Patent Rights) ORCAS IR Sensor (Copyright License)

Michael Scott Hamada (CCS-6)
Reliability Engineering (RE) Computer Codes

Walter J. Hansen (N-4)
MiniGRAND Family of Instruments Advanced Multiplicity Shift Register (AMSR)

William Clarkson Harker (N-4)
SuperHENC Neutron Coincidence Code, Version 1.0 Advanced Multiplicity Shift Register (AMSR)

Neal Richard Harvey (ISR-2)
Genie Pro, Version 2.0

George Joseph Havrilla (C-CDE)
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

Nicolas W. Hengartner (CCS-3)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Ivars Henins (P-24)
Atmospheric Pressure Plasma Jet Portfolio

Hans W. Herrmann (PADWP)
Atmospheric Pressure Plasma Jet Portfolio

Robert F. Hicks (P-24)
Atmospheric Pressure Plasma Jet Portfolio

Michael Allen Hiskey (DE-2)
BTATz Lead-Free (Green) Primaries

Gary Elliott Hogan (P-25)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Terry George Holesinger (MPA-STC)
Superconductivity Technology

Charles Lawrence Hollas (N-2)
Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1

Jennifer Ann Hollingsworth (MPA-CINT)
Optical Amplifiers and Lasers

Shannon Tracy Holloway (T-2)
CINDER 2008

Earl Christopher Horley (ISR-4)
SuperHENC Neutron Coincidence Code, Version 1.0

Andrew Michael Howat (X-6)
SABRINA

Chung-hsing Hsu (CCS-1)
EnergyFit

Jianyu Huang (MPA-CINT)
Manufacture and Application of Nanostructured Metals and Alloys

My Hang Vo Huynh (DE-2)
Lead-Free (Green) Primaries

Kiril Dimitrov Ianakiev (N-1)
MiniGRAND Family of Instruments Advanced Multiplicity Shift Register (AMSR)

Quanxi Jia (MPA-CINT)
Superconductivity Technology Polymer-Assisted Deposition of Metal Oxides and Nitrides

Honggang Jiang (MST-STC)
Manufacture and Application of Nanostructured Metals and Alloys

Kevin Dale John (SPO-SC)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Jeffrey R Johnson (HPC-3)
SABRINA

David C. Jones (N-1)
Hand Held Multiplicity Register

Gregory Kaduchak (B-2)
Low-Cost Portable Flow Cytometry

Thomas A. Kelley (N-1)
PC/FRAM, Version 2.3
PC/FRAM, Version 3.4

Csaba Kiss (B-9)
GFP for flow cytometry kits

Alexei Vasilievich Klimenko (ISR-1)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

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

Shirley F. Klosterbuer (N-4)
MiniGRAND Family of Instruments
Advanced Multiplicity Shift Register (AMSR)

Thomas J. Knight (B-3)
Use of Prolines for Improving Growth and Other Properties of Plants and Algae
Los Alamos Plant Growth and Yield Improvement

Jerome D. Kolar (ISR-SIS)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Sascha Kreiskott (MST-STC)
Superconductivity Technology

Merlyn S. Krick (N-4)
Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting for Use with SuperHENC
Advanced Multiplicity Shift Register (AMSR)

Christopher Scott Kwiatkowski (IAT-2)
Low-Cost Portable Flow Cytometry

Cris Lee Lewis (GS-IA)
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

Alexander Dequan Li (MST-STC)
Polymer-Assisted Deposition of Metal Oxides and Nitrides

Lin Song Li (MST-STC)
Polymer-Assisted Deposition of Metal Oxides and Nitrides

Qingwen Li (MST-STC)
CNT Portfolio for Structural Applications

Yuan Lin (MST-STC)
Polymer-Assisted Deposition of Metal Oxides and Nitrides

Hannah Currier Little (T-2)
CINDER2008

Steven Paul Love (ISR-2)
ORCAS (Patent Rights)
ORCAS IR Sensor (Copyright License)

Terry Curtis Lowe (CAO-OFF)
Manufacture and Application of Nanostructured Metals and Alloys

James S. Lunsford (P-14)
Offset Stabilizer for Comparator Output

Cynthia Ann Mahan (DHS)
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

Mark F. Makela (P-25)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Grace Mann (C-SIC)
Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

John Calvin Martin (B-9)
Low-Cost Portable Flow Cytometry

Jennifer Martinez (MPA-CINT)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Rodolfo Antonio Martinez (B-8)
Use of Prolines for Improving Growth and Other Properties of Plants and Algae
The production of chemicals that incorporate stable isotopes.
Los Alamos Plant Growth and Yield Improvement

Harry F. Martz (D-1)
Reliability Engineering (RE) Computer Codes

Vladimir Matias (MPA-STC)
Superconductivity Technology

Thomas Mark Mccleskey (MPA-MC)

Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)
Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample
Polymer-Assisted Deposition of Metal Oxides and Nitrides

John Morton Mcghee (CCS-4)

Attila, version 2.0

Sheila G. Melton (N-2)

Combined Thermal/ Epithermal Neutron (CTEN-FIT EXE), Version 1.0 and WIN-CTEN, Version 1
TGS-FIT/TGS-MAT

Howard O. Menlove (N-1)

Cosmic-Ray Neutron Background Reduction Using Localized Coincidence Veto Neutron Counting for Use with SuperHENC
SuperHENC Neutron Coincidence Code, Version 1.0

Ryszard Michalczyk (B-8)

Piperazine-based Nucleic Analogs

Alexandre Alexeevich Mikhailovski (C-PCS)

Optical Amplifiers and Lasers

Thomasin Clare Miller (C-ACS)

Method for Detecting Binding Constants Using Micro X-Ray Fluorescence (MXRF)

Edel Mary Minogue (C-DO)

Quantitative Method Of Determining Beryllium Or An Oxide Thereof In A Sample

Terence Edward Mitchell (MST-8)

Photonic Crystal - LiNi and LiTi

David C. Moody (EES-12)

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

Christopher Morris (P-25)

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

Leland Jean Morrison (ISR-4)

A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Harshini Mukundan (C-PCS)

A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Darren Lewis Naud (DE-2)

BTATz

Daniel Lee Neagley (ISR-3)

INFICOMM

David Clair Nelson (ESA-AET)

Continuous Air Monitor (CAM) Technology

Matthew R. Newell (N-1)

Hand Held Multiplicity Register

Michael John O'Connell (C-ACS)

CNT Portfolio for Structural Applications

Richard H. Olsher (RP-2)

Proton Recoil Scintillator Neutron Rem Meter

Frank Anthony Ortega (XCP-1)

General Mesh Viewer, Version 4.5

John Christopher Orum (CCS-6)

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

Kevin Curtis Ott (SPO-AE)

Hybrid Catalyst for Selective Reduction of NOx (also known as ENDURE SCR Catalyst)

Nely T. Padial-Collins (CCS-7)

CartaBlanca

Joseph Mcrae Palmer (ISR-3)

Adaptive Software Radio

Jaeyoung Park (P-24)

Atmospheric Pressure Plasma Jet Portfolio

Robert Francis Parker (N-4)

MiniGRAND Family of Instruments
Advanced Multiplicity Shift Register (AMSR)

Shawn Daniel Pautz (SNL-ASCI)

Attila, version 2.0

David George Pelowitz (N-1)

MiniGRAND Family of Instruments
Advanced Multiplicity Shift Register (AMSR)

Simon John Perkins (ISR-SRS)

Genie Pro, Version 2.0

William L. Perry (WX-7)

Plasma Torch Production of Metal Particles of Controlled Sizes
Low Power Plasma Production of Metallic Nanoparticles

Roger Ronald Petrin (ISR-3)

PIMS, Version 9.0

Dennis Ray Phillips (IPM-2)
Recovery of strontium activity from a strontium-82/rubidium-82 generator

Jonathan Phillips (MST-7)
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

David Platts (P-21)
INFICOMM

Reid Buchanan Porter (ISR-2)
Genie Pro, Version 2.0

William Priedhorsky (LDRD-PO)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Michael Bruce Prime (W-13)
System and Method for Measuring Residual Stress

Jiang Qian (LANSCE-12)
Diamond Silicon Carbide Composites and their Method for Preparation I

David Wesley Reagor (MPA-STC)
Through-the-Earth Radio Technology

Pamela Sue Reass (ISR-4)
MiniGRAND Family of Instruments
Advanced Multiplicity Shift Register (AMSR)

John C. Rodgers (HSR-4)
Alpha Environmental Continuous Air Monitor with Cyclo-Shroud Inlet
Continuous Air Monitor (CAM) Technology

Amos M. Romero (LANSCE-IC)
Advanced Multiplicity Shift Register (AMSR)

Steven Don Salazar (ISR-4)
Advanced Multiplicity Shift Register (AMSR)

Gary Clyde Salzman (ISR-4)
Low-Cost Portable Flow Cytometry

Thomas E. Sampson (N-1)
PC/FRAM, Version 2.3
PC/FRAM, Version 3.4

Alexander Saunders (P-25)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Jurgen G. Schmidt (C-DO)
Piperazine-based Nucleic Analogs
The production of chemicals that incorporate stable isotopes.

Larry Joe Schultz (P-21)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

David Troy Seagraves (RP-2)
Proton Recoil Scintillator Neutron Rem Meter

Gary Stewart Selwyn (P-24)
Atmospheric Pressure Plasma Jet Portfolio

Louis A. Silks (B-8)
Piperazine-based Nucleic Analogs
The production of chemicals that incorporate stable isotopes.

Dipen N. Sinha (MPA-11)
Low-Cost Portable Flow Cytometry

Xuedong Song (B-4)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Kenneth M. Sosnowski (C-INC)
Recovery of strontium activity from a strontium-82/rubidium-82 generator

Michael James Sossong (X-1-TA)
Systems, Methods and Apparatuses for Particle Detection and Analysis and Field Deployment of the Same

Torsten Albert Staab (C-CSE)
Apparatus and Method For Handheld Sampling

Liliana Stan (MPA-STC)
Superconductivity Technology

Enid Joan Sullivan (C-CDE)
ProAqua

Basil Ian Swanson (C-PCS)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Martin Russell Sweet (ISR-4)
SuperHENC Neutron Coincidence Code, Version 1.0
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.
Advanced Multiplicity Shift Register (AMSR)

**Gregory William Swift
(MPA-CMMS)**
*Pulse Tube Refrigerator with Variable Phase Shift and Traveling Wave Device with Mass Flux Suppression
Wayne Allen Taylor (C-IIAC)
Recovery of strontium activity from a strontium-82/rubidium-82 generator*

**Thomas Charles Terwilliger
(INST-OFF)**
*SOLVE, Version 2.0
SOLVE, Version 2.01
SOLVE, Version 2.02
SOLVE, Version 2.0 and Resolve, Version 2.0*

James Patrick Theiler (ISR-2)
Genie Pro, Version 2.0

David John Torres (T-3)
*KIVA-4mpi.beta
KIVA-4mpi, Version 0
KIVA-4mpi*

Clifford Jay Unkefer (B-8)
The production of chemicals that incorporate stable isotopes.

Pat Jean Unkefer (B-DO)
*Use of Prolines for Improving Growth and Other Properties of Plants and Algae
Los Alamos Plant Growth and Yield Improvement*

Igor Olegovich Usov (MST-7)
*Superconductivity Technology
CNT Portfolio for Structural Applications*

Henry Sebastian Vaccaro (NIS-7)
WISDOM and SENSE (W&S)

**Herbert Van De Sompel
(STBPO-RL)**
Blackbox Version 1.0

Kenneth Alan Van Riper (X-10)
SABRINA

**William Brian Vanderheyden
(T-3)**
CartaBlanca

**Jose Vasquez-Dominguez
(MST-STC)**
*Through-the-Earth Radio Technology
Through-the-Earth Radio Technology
Duc Ta Vo (N-1)
PC/FRAM, Version 2.3*

Geoffrey S. Waldo (B-9)
*LANL GFP Portfolio
GFP for flow cytometry kits*

Haiyan Wang (MPA-CINT)
Superconductivity Technology

Michael Dennis Ward (B-8)
Low-Cost Portable Flow Cytometry

Todd Arlin Wareing (CCS-4)
Attila, version 2.0

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

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

James Terrell West (X-6)
SABRINA

William Bradley Wilson (EES-12)
CINDER2008

Mahlon Scott Wilson (MPA-11)
Adiabatic Fuel Cell Stack Composite Bipolar Plates for Electrochemical Cells

Hongzhi Xie (CHEM-PCAS)
A handheld integrated optical biosensor system and accompanying assay. The combination is for the detection of cholera.

Duan Zhong Zhang (T-3)
CartaBlanca

Xiefei Zhang (MST-STC)
CNT Portfolio for Structural Applications

Yusheng Zhao (LANSCE-LC)
Diamond Silicon Carbide Composites and their Method for Preparation I

Lianxi Zheng (MST-STC)
CNT Portfolio for Structural Applications

**Yuntian Theodore Zhu
(MST-STC)**
*CNT Portfolio for Structural Applications
Manufacture and Application of Nanostructured Metals and Alloys*

Qisu Zou (T-3)
CartaBlanca

Fiscal Year 2010 Executed Cooperative Research and Development Agreements (CRADAs)

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

Robert Jason Scharff (WEPEXP-9)

Provide technical insight into the feasibility design and fabrication of utilizing alternative alloys as viable materials in the design of critical flow nozzles. Los Alamos National Laboratory (LANL) will leverage its expertise in computational fluid dynamics modeling and material science capabilities to determine to the optimal engineering parameters necessary for the design and proto-typing of a critical flow nozzle rel-evant to the Participant's intended application.

Acoustic Drilling Optimization

Dipen N. Sinha (MPA-11)

Investigating the use of LANL's advanced acoustic sensor technol-ogy in a whole range of applica-tions related to the optimization of drilling efficiency, oil production, and reservoir management. This is important from the perspective of improving well yields and hence to national energy security.

Carbon Nanotube Composite Conductors

Terry Holesinger (MPA-STC)
Fred Mueller (MPA-STC)

Develop an ultra-high conductivity composite based on carbon nano-tubes. The project seeks to fabricate test specimens of a composite that has significantly higher electrical conductivity than pure copper.

CMR Oxides Based Microbo-lometer Focal Plane Array with Reduced i/f Noise

Quanxi Jia (MPA-CINT)

Deposit La0.7Sr0.3MnO3 films on different substrates by both pulsed laser deposition and polymer-assisted deposition. The structural and transport properties of the films will be characterized as well.

Continued Development of Muon Tomography Scanner for Detection of Potential 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 development project is to develop an improved muon tomography scanner for this purpose.

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

Steven F. Stringer (TT-DO)

The Participant will have the lead role in developing a standards-based online science course for high school credit that will cover alternative and renewable energy and fuels using a 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. The Participant will perform within a 6-month schedule approximately 90% of the project tasks, as evidenced by the ratio of in-kind funding vs. funds-in to the Laboratory. The Participant will develop video interviews and virtual field trips in consultation with Laboratory scientists over a two-month period. The Laboratory filming task will complete one week.

Development of Nanostructured Titanium and Bioactive Coating Echnologies for Manufacturing Dental Implants

Amit Misra (MPA-CINT)

Develop and implement production technology for fabricating a coated ultrafine grain titanium dental implant. There are underlying objectives to reduce the proliferation of weapons of mass destruction technology and to create jobs in the USA and in Russia.

Development of Pathogen Detection Technology

Harshini Mukundan (C-PCS)

Technology will be developed for the adaptation of a waveguide-based optical biosensor platform developed at the Los Alamos National laboratory (LANL) for the detection of disease causing pathogens, for commercialization.

Downhole Acoustic Camera

Dipen N. Sinha (MPA-11)
Cristian Pantea (MPA-11)
John Brady (MPA-11)

Paul Mombourquette (MPA-11)

Investigating the use of LANL's advanced acoustic sensor technology in a whole range of applications related to the optimization of drilling efficiency, oil production, and reservoir management. This is important from the perspective of impriving well yields and hence to

national energy security.

GMRS Bore Stress

George Anthony Zyvoloski (EES-16)

Provide a theoretical material model for reservoir rock that reflects the observed behavior of the rock during deflation and inflation of the reservoir. Material models of this type are not typically handled with purely elastic rock models. Los Alamos National Laboratory will develop an invariant form of a plasticity model for rock. LANL will develop and test a theoretical material model using analytical and computational methods and provide guidance to the CRADA Participant to test this model in the laboratory.

High Temperature Superconductor (HTS) Coated Conductor Samples in Tape Form

Jeffrey O. Willis (MPA-STC)

The Parties will study the feasibility of using Los Alamos National Laboratory's (LANL's) ion-beam assisted deposition (IBAD) technology in conjunction with Participant's proprietary metal organic chemical vapor deposition ("MOCVD") process for depositing oxide buffer layers and high temperature superconductors (HTS) on metal substrates, to produce HTS coated conductor samples in tape form. LANL will train Participant in the use of its IBAD technology and will provide Participant with 1-10 meter

long IBAD template tapes, which Participant will convert into HTS coated conductor samples using its proprietary MOCVD process. LANL will then perform electron microscopy and/or other tests on these samples and the Parties will characterize these samples for electrical measurements of critical currents, magnetic field dependence thereof, and ac-losses.

Hybrid Channelized Activity DETector (CADET) System

Scott Henry Robinson (ISR-4)

The U.S. Air Force is responsible for the development, deployment, upgrading and operations of a number of radio frequency (RF) collections systems tasked to acquire, analyze, report and distribute RF signal data. In this role they provide information of high importance to organizations both inside the Department of Defense (DoD) along with other governmental agencies outside the DoD. Periodically these collection systems are modified and enhanced to accommodate mission changes and to ensure a continuing capability to collect against evolving RF technologies. As part of the ongoing requirement to upgrade these RF collection systems Los Alamos National Laboratory (LANL) will provide the engineering solution for high sensitivity detection of RF signal activity. This technology will be incorporated into the Digital Data Recorder (DDR) being developed by the CRADA Participant. The existing Channelized Activ-

ity DETector (CADET) algorithm developed by LANL will be modified and integrated with CRADA Participant's Parameter Encoder (PE) to capture Pulse Descriptor Words (PDWs) and Burst Digitized data.

Hydrocarbon Impurity

Alp Tugrul Findikoglu (MPA-STC)
Andrew Beveridge (ISR-2)
John Rowley (MPA-STC)

Determine acoustic or other field-based methods for separation/flocculation/fractionation of oil components from aqueous suspensions.

Hyperion Power Generation Small Reactor Development

Patrick Ray Mcclure (D-5)

Jointly design a small transportable reactor with a power output of approximately 70 MW thermal. The design will be incorporate HPG technology to make the reactor simple to operate, reliable and very safe. The goal of the project is to produce a design that can be certified by the Nuclear Regulatory Commission (NRC) using current regulatory statutes. The end state of this project would be a design that has sufficient detail, such, that the next phase of the project could develop the Design Certification Document (DCD) that would be submitted to the NRC.

Implementation of Reactive Coevaporation for Long Length RBCO Coated Conductors Based on IBAD Templates

Vladimir Matias (MPA-STC)

The film deposition technique of reactive coevaporation (RCE) has proven to be a reliable, high-throughput, low-cost method for production of high temperature superconducting (HTS) films on single-crystal substrates for radio frequency filter applications. This method should also offer substantial advantages in terms of performance and cost for HTS coated conductor applications. Los Alamos National Laboratory (LANL) has been exploring RCE in combination with its ion beam assisted deposition (IBAD) biaxially textured templates on metal tape substrates. Under this CRADA, the Participant with its developed RCE expertise will work with LANL toward optimizing the deposition of HTS films on IBAD textured templates for coated conductor applications. In addition, LANL will work to optimize the IBAD templates to best match the RCE techniques at the Participants and provide further cost reductions. The development and refinement of these two techniques will result in the transfer of a superior IBAD template technology for the Participant for commercializing coated conductors produced by RCE.

Malware Project

Anthony S. Clark (D-1)

Everyday hackers are becoming more and more sophisticated in their attacks and there is a need for antivirus solutions that do not rely on signatures. The CRADA Participant and Los Alamos National Laboratory (LANL) will collaborate to develop a next generation statistical lightweight signature-less malware detection tool.

Materials for Preparing Weighted Packer Fluids Having Electrically Insulating Properties

Robert E. Hermes (TT-DO)

Investigating the use of weighted fluids in conjunction with LANL's down-hole communications technology INFICOM to prevent well failure.

Mimetic Finite Differences and Algebraic Multilevel Methods for Reservoir Performance Predictions

John David Moulton (T-5)

The need to better predict and control reservoir performance is driving the development of increasingly sophisticated reservoir models that use unstructured general polyhedral grids to capture highly detailed stratigraphy. However, both discretization methods and scalable iterative solution algorithms for these situations are an active area of research. In this work we will compare the performance of a new Mimetic Finite Difference (MFD) method with two new Mixed Finite Element methods, and LANL and the CRADA Participant will investigate the performance of Los Alamos National Laboratory's algebraic multigrid code on realistic flow problems. Further more, uncertainty quantification requires rapid evaluations of reservoir models. To do this, fine-scale reservoir models need to be coarsened and yet important fine-scale features and processes that have a significant impact on flows need to be preserved. To this end, we will investigate the use of multi-resolution methods, such as the Multilevel Multiscale Mimetic (M3) method, to coarsen reservoir models.

Multiple Exciton Generation (MEG) Photovoltaics

Milan Sykora (C-IIAC)

Investigating the use of the Multiple Exciton Generation (MEG) technology toward the development of a new generation of photovoltaic (PV) devices.

Near-Zero Emissions Combustor System for Biofuels and MSW-derived Fuels

Yong Ho Kim (P-24)

Test a novel, high-efficiency, low-emissions combustion technology, developed by the IHCE (Institute of High Current Electronics), for electricity and heat production from syngas/biofuels in contemporary gas turbines. LANL will work with the Participant to develop scaling criteria, and carry out economic projections for industrially-relevant prototypes of the new high pressure multi-fuel turbine technology. This project is carried out under the auspices of the US Department of Energy's Initiative for Proliferation Prevention (IPP) program and the United States Industry Coalition (USIC).

Non-precious Metal Cathode Catalysts

Piotr Zelenay (MPA-11)

The stringent cost and performance targets of an automotive fuel cell require either a more active precious metal catalyst or a lower cost catalyst than the standard platinum catalyst. Non-precious metal catalysts (NPMCs) are a low cost alternative, but the current oxygen reduction reaction activity requires electrodes of unreasonable thickness to meet the performance targets. NPMCs also typically suffer from low durability in the acidic and oxidative environment of the fuel cell cathode. The goal of the collaboration between UTC Power Corporation (UTCP) and Los Alamos National Laboratory (LANL) is to increase the activity and durability of NPMCs to meet the needs of the automotive industry.

Nonlinear Acoustic Reservoir Imaging

Dipen N. Sinha (MPA-11)
Cristian Pantea (MPA-11)
Paul Johnson (EES-17)
James Tencate (EES-17)
Pierre-Yves Le Bas (EES-17)
Carene Larmat (EES-17)

Investigating the use of LANL's advanced acoustic sensor technology in a whole range of applications related to the optimization of drilling efficiency, oil production, and reservoir management in deep wells. This is important from the perspective of improving well yields and hence to national energy security.

Numerical Modeling Capability for Hydrocarbon Extraction from Oil Shale Deposits

Rajesh J. Pawar (EES-16)

Develop a numerical modeling capability that will be applicable to the oil shale extraction process currently under development by the CRADA Participant.

Particle Separation

Alp Tugrul Findikoglu (MPA-STC)
Andrew Beveridge (ISR-2)
John Rowley (MPA-STC)

Determine acoustic or other field-based methods for separation/flocculation/fractionation of particulates from aqueous suspensions.

Scale Up High Throughput IBAD-PLD Processes

Leonardo Civale (MPA-STC)

Establishing coating facilities and associated processes at the Participant's facility that can be used to fabricate high-temperature superconducting (HTS) YBa2Cu307-x (YBCO) coatings on 100 m lengths of flexible metal tapes that conduct 100 A when cooled by liquid nitrogen. LANL will measure superconducting properties structurally characterize coated conductor tapes. LANL will assist the Participant in the conceptual design of extended facilities capable of industrial manufacture of long length HTS tapes.

Security Agent for Energy Automation Refactoring

Curtis Vincent Canada (D-1)

Refactoring, embedding and testing three different Siemens Corporate Research implemented security agents into a more flexible and maintainable suite of security tools.

Small Reactor Development

Patrick Ray Mcclure (D-5)

Jointly design a small transportable reactor with a power output of approximately 70 mega watts thermal. The design will incorporate the CRADA Participant's technology to make the reactor simple to operate, reliable and very safe. The goal of the project is to produce a design that can be certified by the Nuclear Regulatory Commission (NRC) using current regulatory statutes. The end state of this project would be a design that has sufficient detail, such that, the next phase of the project could develop the conceptual design and begin the development of the design certification document that would be submitted to the NRC.

Spectral Assisted Moving Vehicle Tracking

Lee K. Balick (ISR-2)

Current approaches to the automated tracking of moving vehicles uses techniques that rely on spatial-temporal characteristics coupled with moving object maps and tracking techniques. If the vehicle can be continually tracked, these techniques will work well. However due to gaps in coverage or the vehicle executing evasive maneuvers, temporal tracking procedures can fall short of their goal and additional characteristics that can uniquely identify a target vehicle must be considered. In this proposed STTR we propose to investigate methods where the spectral observable of the moving vehicles can be useful to improve the efficacy of tracking. TRA proposes to investigate methods to incorporate spectral-assisted techniques into the tracking of moving vehicles, ultimately in real-time. Our Phase I proposal focuses on understanding the phenomena associated with the spectral observables of vehicles for day/night longwave infrared (8 to 13 um) and day-only visible/near-

infrared/shortwave infrared (0.5 to 2.4 um) observation. We propose to collect data in both spectral bands and develop algorithms that can distinguish one vehicle from another by their spectral/thermal characteristics. Algorithms will be tested using data collected on stationary vehicles from ground instruments. Technical Research Associates, Inc. has partnered with Los Alamos National Laboratory (LANL) and the University of Hawai'i in this STTR proposal.

Stationary Anti-Scatter Grids for Digital Breast Imaging

Mark Arles Hoffbauer (C-CDE)

The National Institute of Health (NIH) has funded this Small Business Innovation Research (SBIR) for the Participant to develop a method for fabricating focused x-ray anti-scatter grids for application to digital mammography. Such grids must have very small septa, high aspect ratio, and high accuracy, and the septa must match the pixels of the digital mammography detector over a large area. The etching process developed by Los Alamos National Laboratory (LANL) using energetic neutral atom beam lithography/epitaxy (ENABLE) will be applied to the fabrication of such grids by making highly-precise cuts into polymer substrates. The Participant will use the resulting molds to fabricate metal grids by electroforming or casting.

Tactical-Switchboard Application

Charles David Cremer (D-1)

Refactoring, embedding and testing three different Siemens Corporate Research implemented security agents into a more flexible and maintainable suite of security tools.

Thermal Management of Submersible Electric Motors

Todd Andrew Jankowski (AET-1)
Dallas Hill (AET-1)
Robert Bourque (AET-1)

Investigating the use of LANL's advanced thermal analysis capability and extensive knowledge of heat pipes for cooling downhole oil industry motors. Improved cooling of the motors is expected to result in increased reliability and greatly lower motor maintenance costs in producing wells. This is a key enabling technology for further development of many domestic U.S. oil reserves such as the steam injection fields of California or deep-water Gulf of Mexico.

University of Texas Permian Basin Curriculum Development

F. Jeffrey Martin (D-5)

Develop Course Curriculum.

X-Ray Precision Navigation and Time (XPNT) or X-Ray Time (XTIM)

Richard C. Schirato (ISR-1)

Develop payload and sensor X-Ray technologies. The payloads developed are expected to support a government customer and Space Situational Awareness (SSA) missions.

Fiscal Year 2010 Work for Others – Non Federal Agreements Executed

Integrated Standoff Inspection System (ISIS)

Mark Sidney Wallace (GS-PO)

LANL will contribute it's expertise in simulation and modeling, detector design, and software development towards the goals of the Integrated Stand Off Inspection System (ISIS). ISIS is intended to be a fully integrated detection system comprised of the following components which are all at TRL 4 or greater: (1) compact S-band electron accelerator with selectable endpoint energies and variable beam pulse structures mounted in a self-contained, transportable ISO container; (2) autonomous detector packages operable in both monostatic and bistatic modes (i.e. either adjacent to or separate from the beam generation subsystem) (3) an automated electro-optical system for ranging, targeting and tracking the inspected vessel/vehicle and maintaining the highly collimated photon beam on target.

Energy Water Systems, Carbon Management and Social Impact - The Web Portal and Outreach Component

Gordon Neal Keating (EES-16)

Develop a Web portal that will interest, inform, enlist, and retain input from the Sonoma Regional citizenry with the goal of mapping out a course towards energy sustainability and resilience, carbon neutrality, and economic vitality, given projections of future climate change. The solution options to be developed are to serve as examples for the state of California, the U.S., and international organizations. In large part, the project is to meet the goals of carbon footprint reduction outlined within AB32 and the Western Governors Initiative.

Statistical & Data Managment - Pediatric Analyses

Brian Thomas Foley (T-6)

LANL will use DNA and protein sequence analysis tools, such as phylogenetic analyses, to analyze sequence data generated as part of AIDS Pediatrics clinical trials.

Statistical and Data Management - Adult Analyses

Brian Thomas Foley (T-6)

LANL will use DNA and protein sequence analysis tools, such as phylogenetic analyses, to analyze sequence data generated as part of AIDS clinical trials for Adult Analyses.

Editorial Review of Computation Materials Science

Richard Lesar (T-DO)

Publications in Computational Materials Science are intended as reports of significant, original and timely research results in all areas of computational materials research. The Editor focuses on all topics in computational materials science, condensed matter physics, and statistical physics. While the materials community has grown enormously, and now includes universities and private industries, the need for DOE laboratories to maintain their preeminence in computational materials research remain compelling. Among the most effective tools for maintaining scientific credibility and attracting capable young scientists are publications in the journal of Computational Materials Science. The Editor can promote such publication while maintaining the reputation and scientific standards of the Journal.

Automated Literature Mining for Validation of High-Throughput Function Predictions

Michael E. Wall (T-CNLS)

LANL will develop methods for automatically mining the full text literature to validate computational predictions of functional sites in proteins.

Advanced Elastic/Inelastic Nuclear Data Development

Toshihiko Kawano (T-2)

This project will address the identified APCI fast reactor campaign need for high precision nuclear data files for elastic/inelastic neutron scattering from fuel components, coolants and structual materials. In order to deliver these new high precision nuclear data files, advances in basic nuclear theory must be made and supplemental experimental data measured and provided to complete the picture. A novel, yet practical, approach will be developed in this project to deliver the nuclear data that address the advanced fuel cycle's R&D identified elastic and inelastic cross section data needs.

Analysis of Bacillus Thuringiensis Strains

Karen Koons Hill (B-7)

Sponsor will provide 4-5 cultures representing 4-5 strains of Bacillus thuringiensis bacteria. This non pathogenic, nonhazardous species of bacteria – a biosafety level 1 organism- will be cultured within LANL by trained personnel. DNA will be isolated from the cultures using nonhazardous chemicals. The DNA preparations will be used in Amplified Fragment Length Polymorphism (AFLP) experiments. The AFLP data will be analyzed and an AFLP-based dendrogram will be generated that includes previously analyzed pathogenic and nonpatho-

genic B. cereus and B. anthracis and B. thuringiensis strains. This dendrogram in a final report will be provided.

Analysis of Geologic CO2 Sequestration Potential of the Rock Springs Uplift, Wyoming

Philip H. Stauffer (EES-16)

This project focuses on determining the feasibility of using the deeper sections of the Rock Springs Uplift (RSU) as a CO_2 sequestration reservoir. Additionally, part of the scope includes support for modeling work in the Big Horn Basin, the Moxa Arch, and the Powder River Basin.

Anti-Retroviral Therapy and The Hepatitis C Virus

Alan S. Perelson (T-6)

Conduct data analysis and mathematical modeling including the development of a new model of HCV viral load increase in the setting of antiretroviral therapy initiation.

ATK HPM Support

Bruce Eric Carlsten (ISR-6)

Provide Subject Matter Expertise (SME), material development, and characterization for alternative energy specialty materials sources, and analyses for Alliant Techsystems (ATK) Directed Energy and Aerospace applications for compact pulsed power, mm-wave, hypersonic, effects testing, boutique HPM

weapons, dielectric materials, and alternative energy sources technologies.

Center for Spatiotemporal Modeling of Cell Signaling (STMC)

William Scott Hlavacek (T-6)

LANL will particpate with the University of New Mexico in a new NIH Systems Biology Center. The Center will focus on a single cell type, the mast cell, and how it senses its environment and responds to the stimuli it received through receptors on its surface. This cell plays a central role in allergic reactions. The seeds of an allergic reaction are sown when the immune system mistakenly recognizes a foreign substance (an allergen) that is normally harmless and produces antibodies that bind to the allergen. When this occurs, complexes form that can bind to receptors (FceRI) on the mast cell surface. The binding initiates a chemical cascade within the mast cell that often results in the cascade and develop specialized biochemical reagents to probe the cascade. The aim is to understand the signaling processes that result in mast cell responses.

Development of High-Efficiency, High-Power Electron Beam Accelerator Technologies

Frank L. Krawczyk (ISR-6)

An accelerator design with increased readiness and availability will be developed. LANL will provide a baseline accelerator design that is relevant to our needs. LANL will provide the expertise on cryogenics issues in the coupler design, and engineering details for the specifications of a cryogenic system to operate such a device. The proposed modifications to the baseline design will be used to generate a modified accelerator layout. This layout will be evaluated to determine improvements in readiness and availability. LANL will provide an evaluation to ensure that the overall needs of the application of the accelerator are still met in terms of delivery of an electron beam of very specific properties. Finally, LANL will support the generation of a drawing package for the fabrication and testing of the proposed coupler in a follow-up (Phase II) funding period of the proposal.

Development of Rapid, Inexpensive, Multiplex Assays for Simultaneous Detection and Strain Characterization of Multiple Citrus Pathogens

Paul Scott White (B-7)

Rapid, specific detection of citrus pathogens is needed for acquiring new propagative material, and to insure the safety of existing orchards. The National Clonal Germplasm Repository for Citrus & Dates provides indexing and viral/viroid elimination. Although time-consuming, most of this time is required for the elimination, and an inexpensive, rapid assay would allow more material to be evaluated in a shorter period of time. PCR assays are in wide use, including assays for citrus pathogen detection, however multiplex assays have the advantage of providing highly specific screens for multiple pathogens simultaneously due to the use of multiple markers per pathogen. We have designed and tested a 50-plex assay for detection of three citrus pathogens, Xylella fastidiosa, Xanthomonas spp., and Citrus Tristeza Virus. Furthermore, discrimination is provided by targeting single nucleotide polymorphisms to distinguish among close relatives. We propose to create assays for these pathogens using updated sequence information, and to add markers for Ca. Liberobacter spp. We will also assemble a test panel of DNAs and cDNAs from each pathogen, and perform assay validation. Finally,

we will partner with industry and testing labs to provide a deployed capability to perform testing of hundreds to many thousands of samples per year.

Development of Safeguards Systems for the Japanese MOX Fuel Fabrication Plant (JMOX)

Johnna Marlow (N-1)

This work involves the development of the efficient and effective safeguards systems for the Japanese MOX fuel fabrication plant (JMOX) of Japan Nuclear Fuel Limited (JNFL) that will be under the International Atomic Energy Agency (IAEA) safeguards inspection. The design of the safeguards system should consider plant design and operation requirements, operator accountability requirements, and national and international safeguards requirements.

Development of Software to Digitize Historic Hardcopy Seismograms from Nuclear Explosions

Xiaoning Yang (EES-17)

This project will investigate the feasibility of developing computer algorithms and associated software to digitize scanned hardcopy seismograms from historic nuclear explosions. LANL tasks in this project are to develop a graphic user interface (GUI) software package and to aid in data collection and algorithm development.

Direct Numerical Simulation of Oil Water Interactions in Sand

Duan Zhong Zhang (T-3)

The proposed project is to use CartaBlanca, a multi-physics analysis code developed by LANL to study the interactions of oil, gas and water in sand.

DUSEL S4 project

Steven Ray Elliott (P-23)

This work advances the technical design of a tonne-scale 76Ge based neutrinoless double beta decay experiment that might be a candidate for installation at a later stage in the Deep Underground Science and Engineering Laboratory (DUSEL) in Lead, South Dakota.

Examining Food Risk in the Large Using a Complex, Networked System-of-Systems Approach

John Joseph Ambrosiano (D-4)

The United States food production infrastructure is a highly complex system of systems (SOS). Many of the foods we eat are complex, manufactured products with many constituent ingredients, any one of which could be a source of contamination. The supply-distribution links connecting these systems are themselves complex networked systems only partially characterized at best. Yet they may amplify or mitigate risk depending on their structure. This makes assessing

the risk to our foods a daunting task. Traditional probabilistic risk assessment (PRA) relies on detailed system information typically limiting its application to estimating risk associated with specific facilities. Heuristic approaches based purely on expert judgment are more broadly applicable, but lack the mathematical rigor necessary to reliably evaluate large-scale, complex systems. We will develop a novel approach to characterizing the safety of complex food products using a model problem of snack cake manufacture based on combining models of dynamical systems and complex distribution networks.

Experiments for Genome Packaging in HBV Nucleocapsids

Rex Paul Hjelm (LANSCE-LC)

This exploratory research aims to establish computational and experimental means for predicting non-specific biomolecular interactions within Hepatitis B virus (HBV) nucleocapsids that underpin the viral capsid formation and stability. Neutron and X-ray scattering measurements will be carried out to verify and optimize the modeling results. The proposed research aims to solve for the internal microscopic structure of nucleocapsids including the distributions of encapsidated nucleic acids and unstructured protein domains and provide a basis to understand viral assembly. Both theory and scattering experiments will be closely guided by the current

and future biochemical and genetic studies of HBV morphogenesis and the biophysical analysis will in turn frame future biochemical and genetic approaches to regulate and ultimately eradicate HBV infection.

Fast Response Methane and Carbon Dioxide Tests

Thomas A. Rahn (EES-14)

Los Alamos National Laboratory (LANL) agrees to test the new Picarro high speed CO_2/CH_4 analyzer simultaneously with LANL's current measurements in order to establish performance of the new technology relative to traditional methods. LANL will measure the photochemical release of CO_2 and CH_4 from dried plant matter using traditional non-dispersive infrared (NDIR) and gas chromatographic methods and compare them to measurements made with the new Picrrao Cavity Ring Down Spectrometer in order to compare performance of new to existing technology.

Finite Element Models Relating Fault Slip Rates, Geodetic Deformation, Fault Geometries and Stress Evolution in the Southern California Fault System

Carl Walter Gable (EES-DO)

The task of building finite element meshes and the training of an MIT student as required for the project will be the main objective of the LANL portion of this project. This involves LANL because the capability to build these finite element meshes specialized for geologic applications and that seamlessly interface with the PyLith physics code is unique to LANL.

Free Electron Laser Innovative Navy Prototype Preliminary Design

Dinh Cong Nguyen (ISR-6)

Support of the development of the 100 kW scaleable Free Electron Laser (FEL). The preliminary design effort for the scaleable FEL system described herein will lead to a MW class FEL system to be integrated onto marine based platforms in the future. The task-based and support-based efforts described in this SOW contribute to Phase IA of the overall FEL program effort. Phase 1A will result in a preliminary design of the 100 kW scaleable FEL system and a presentation of the system design at a Preliminary Design Review (PDR). Future phases that may or may not be funded include detailed design phase (Phase IB), a fabrica-

tion, integration, and check-out phase (Phase II), and a system test phase (Phase III). This SOW covers only Phase IA. This Statement of Work (SOW) defines the efforts to be performed by Los Alamos National Laboratories hereinafter referred to as Subcontractor for the FEL program.

GEM: Combining Remote and in Situ Observations in the Plasma Sheet

Sorin Gabriel Zaharia (ISR-1)

The main topic of this project is inferring physical quantities in the Earth's magnetosphere (plasma sheet ion density, temperature, and pressure) remotely from ionospheric observations from the low-altitude DMSP satellites. The work to be done at LANL will involve numerical simulations of three-dimensional magnetosphere structure to compute the magnetic field self-consistent with the observed plasma data. The magnetic field will thus be used as a way of improving the mapping between the ionosphere and magnetosphere. Furthermore, the induced electric fields will be computed from time sequences of magnetospheric magnetic field structures.

GHAVE Sequence Database; 10 Sequence Analysis/AIDS Vaccine Discovery Comprehensive Antibody Vaccine Immune Monitoring Consortium

Bette Tina Marie Korber (T-6)

The proposed study will enable both standardization and detailed characterization of neutralizing antibody characteristics of sera derived from HIV positive individuals during acute infection and vaccine recipients. This will provide a framework to define subtle improvements in vaccine elicited neutralizing antibody intensity and cross-reactivity and to combine strategies that show promise, as well to rationally selected and design new vaccine reagents based on antigenic characteristics of proteins of known sequences. A critical element will be the integration of the results from different studies enabling direct comparisons. The Los Alamos specific compartment of our larger database, tailored to meet the needs of this project. Second, we will provide a web-based publicity searchable face of the published data from the consortium, to facilitate open exchange of information. Third, we will assist with the analysis and interpretation of complex patters of immunological reactivity and sequence variation.

High-Throughput Identification of Influenza Virus Amino Acids Responsible for Human-to-Human Transmission

Catherine Ann Macken (T-6)

Develop and implement computer codes to predict amino acid changes in the polymerase proteins of avian influenza virus that are important for adaptation of the virus to human-to-human transmission for the Sponsor. These predictions will be based on the LANL PI's research results for a statistical analysis to detect significant interactions across influenza proteins. The computer codes will build on existing data management capabilities of LANL's Influenza Sequence Database. Predictions will be supplied to the Sponsor for experimental testing. LANL statistical analysis and computer codes will be adapted if necessary to improve the accuracy and power of predictions. The Influenza Sequence Database (ISD) was fully developed by LANL and is a database-driven web site, with extensive and unique capabilities for storage and analysis of influenza genetic and protein sequences. The ISD is a large, mature project that has been partially supported by the CDC (USA) to extend ISD capabilities for supporting national and international public health and research interests connected with influenza. ISD staff will curate these data to the highest level applied to public data in the ISD. ISD staff will make available all analysis tools that

have been designed for public use. ISD will develop custom features for data management and analysis to meet individual Sponsor's needs, as determined by analysis of required performance.

Hydrogen Storage Materials

Thomas Ernst Proffen
(LANSCE-LC)

The technique of periodic density functional quantum chemistry will be used to study the structure and properties of the metal alloy hydride phases. The computational approach will allow us to predict the most likely sites both on the surface and in the bulk material for hydride formation as well as the energetics of the process. Using these results, plausible metal hydride models can be constructed which can be directly compared with measurements of the local structure from neutron spectroscopy.

Hyperion Reactor Assessment and Technical Assistance

F. Jeffrey Martin (D-5)

The Sponsor has been contracted to market the Hyperion Reactor, and fund and manage the technical assessment of the Hyperion Reactor concept. The Sponsor is contracting LANL to perform the technical assessment, and provide technical assistance, because of its unique experience capabilities related to uranium hydride and nuclear

reactor technology and industry.

Immune Response Consortium: Integrated in Silico, In Vitro, and In Vivo Studies

Alan S. Perelson (T-6)

LANL will develop models of the kinetics of Listeria monocytogenes infection and the cell-mediated immune response to this infection in the mouse, using a variety of differential equation models that are informed by experiment. The work will also involve modeling how T cell find L. antigen presenting cells using information derived from experiment about rates of T cell movement in tissue. The work is aimed at answering very basic questions in immunology about how T cell fight infections.

Improved Fission Neutron Data Base for Active Interrogation of Actinides

Robert Cameron Haight (LANSCE-NS)

This three-year project proposes to build a team of four top universities and one national laboratory to develop innovative neutron detection system for active interrogation measurements. Many active interrogation methods to detect fissionable material are based on the detection of neutrons from fission induced by fast neutrons or high-energy gamma rays. The energy spectrum of the fission neutrons provides data to identify the fissionable isotope(s)

and materials such as shielding between the fissionable material and the detector. The challenges for making confident measurements are the detection of neutrons in the energy ranges of 0.01 – 1 MeV and above 8 MeV. These regions are also where the basic data on the neutron energy spectrum emitted from fission is the least-well known. In addition, improvements in the specificity of neutron detectors are required throughout the complete energy range: they must be able to clearly distinguish neutrons from other radiations, in particular gamma rays and cosmic rays. We believe that all of these challenges can be addressed successfully with emerging technologies under development by this collaboration. In particular, the collaboration will address the area of fission neutron emission spectra for isotopes of interest in the advanced fuel cycle initiative (AFCI).

Improved Plutonium Canister Assay System (iPCAS) Phase VII

Martyn Thomas Swinhoe (N-1)

This work continues the design, supply and installation of NDA monitoring systems for the Sponsor.

Innovative Exploration Techniques for Geothermal Assessment

Kenneth Rehfeldt (EES-17)

Provide technical data collection and analysis to support devel-

opment of a geothermal energy resource to the Sponsor. LANL will provide geologic mapping, geologic sample collection, X-ray diffraction (XRD) and X-ray fluorescence (XRF) analyses of the samples, petrographic analysis, stable isotope analyses and isotope ratios. LANL will plan a seismic monitoring network and analyze the resulting data. LANL will plan and interpret VSP downhole seismic data collection. LANL will plan and interpret a two well tracer experiment.

Intermediate MCNP/MCNPX Training Course

Laurie S. Waters (D-5)

One technical staff member of Los Alamos National Laboratory (LANL) will travel to Barcelona, Spain and conduct training course/workshop, MCNP/MCNPX (Monte Carlo N-Particle eXtended) on October 25-29, 2010. The workshop will contain the following modules: Geometry, Sources, Tallies, Physics, Statistics, Variance Reduction and Criticality.

Isotopic Uranium Analysis of Groundwater

Michael Tildon Murrell (C-NR)

Conduct uranium analysis of the Sponsor's groundwater and surface water samples to determine total and isotopic (234U, 235U, 236U and 238U) uranium.

LANL PosinstV6 Enhancements

Lawrence John Rybarcyk (AOT-ABS)

Los Alamos National Laboratory (LANL) will support the sponsor in the technical task of developing and implementing improvements to the LANL Posinst code for simulation of electron cloud generation in long-bunch, high intensity proton accumulator rings.

Large Magnet System Upgrade

Charles H. Mielke (MPA-CMMS)

Non-destructive pulsed magnets must solve the problem of the exceedingly high stresses generated in the magnet during pulsing. Funds from Florida State University (FSU) will be used to purchase components for a new set of magnet coils for the 60T Long Pulse and 100T Multi Shot Magnet Systems. Magnet components will include the purchase of specialty conductors as well as the processing of the conductor for preparation of winding into magnet coils. In addition to conductor material, the reinforcing shells and assembly components will also be procured and fabricated into individual magnet coils for the two new magnet systems. Additional funds from FSU will be used for new cryostats. Low loss cryostats will be purchased and installed to decrease consumption of liquid helium for magnet systems that are used for the User Program experi-

ments. The improved efficiency is required to contend with the increasing costs of liquid helium.

LIBS Mars Project

Roger Craig Wiens (ISR-1)

The first space mission involving laser-induced breakdown spectroscopy (LIBS) will be the Mars Science Laboratory (MSL) rover recently named "Curiosity", which is to launch in 2011. A very needed element for planetary LIBS studies in general is a database of pure element standards similar to that already done at Delaware State University in air, only for Mars applications it is needed to be done under Mars atmospheric conditions, i.e., 6 mbar of CO_2. Based on our expertise in planetary LIBS, LANL proposes to provide consulting for this project. LANL also proposes to mentor students, during short stays at LANL, in multivariate analysis of LIBS data taken on analog samples relevant for Mars, the Moon, Venus, comets, or asteroids and potentially applicable to other LIBS applications as well. In later phases of this five-year project students may also participate in analyzing Mars data taken with the ChemCam instrument. The project will include some travel (covered by DSU) to meet with DSU NASA URC investigators to discuss the above topics.

Mapping for Specialized Domains for FCeRI Signaling & Internalization

Andrew M. Bradbury (B-9)

The goal of this work is to select one or more antibodies fragments against cell surface proteins.

MINISENS PROJECT

Thomas Chatters Hale (ISR-2)

LANL will assist the sponsor with a technical survey of remote sensing technologies in relation to their implementation of Unmaned Aerial Vehicles (UAVs). The survey will be focused on determining which remote sensing technologies best suited for UAV applications. We will evaluate both existing and emerging technologies.

Modeling of Host Immune Responses and Antiviral Therapy Against Hep C Virus Infection: In Vivo and In Vitro

Alan S. Perelson (T-6)

Hepatitis C virus (HCV) infects about 3% of the world's population. There is no vaccine and current therapies work in only about 50% of people. A major obstacle in studying HCV, its interactions with the host immune system and in designing antiviral drugs, has been the lack of cell culture systems that supports HCV replication. A system that support the replication of the HCV genome called a repicon system has been developed. LANL will develop

models of the replicon system and use them to understand the action of antiviral therapies for HCV.

MSM mapping and Modeling ErbB Membrane Topography

Yi Jiang (T-5)

Dysregulated signaling through members of the ErbB family of receptors occurs in a high proportion of hormone-responsive cancers, and antibodies and tyrosine kinase inhibitors that target ErbB family members can improve the quality and length of life in some patients. Nevertheless, these complex cancers ultimately recur, most likely because the tumors either harbor, or evolve to produce, cells that resist both rationally-designed and traditional therapeutics. The aim of signal transduction models is to predict how the components of a signal cascade work together to decode signals that are initiated by a specific pattern of binding events at the cell surface. This information needs to be integrated with data on the behavior of whole cells, and eventually whole tissues, in order to predict responses to therapy. Modeling at multiple scales is clearly key to analyzing experimental data in measured at the molecular, cellular and tissue levels. This project has two goals: The biologists' goals are to ask biological questions related to the ErbB family that has intrinsic validity and importance in the carcinogenic process. In doing so, we will take special care to collect quan-

titative data sets that are uniquely suited to mathematical analysis. The modeling team's goal is to use these data to evaluate how spatial and temporal distribution of the signaling molecules at the membrane plays an important role in the early events in ErbB signaling. Animal models - both in vivo and in silico - will seek to make testable predictions about tumor behavior in the context of altered receptor expression, mutational state, drug exposures and other input parameters. We have the combined expertise to develop multiscale mathematical models that fit experimental data at the molecular and cellular level and to translate the results to human disease. An ultimate goal is use our multiscale approaches to understand the behavior of human tumors and their response to complex treatments.

New Mexico Renewable Development Study

Gasper Loren Toole (D-4)

Develop a model and conduct a New Mexico Renewable Energy Development Study that will provide a "screening" analysis of options for accelerating potential renewable energy development. This independent study will be conducted by LANL to provide information for policy direction by state regulators, project developers and legislators. In addition, the study will evaluate potential cost allocation methodology and statewide collector system concepts.

Novel Fiber Optic Methods

Charles Reed Farrar (INST-OFF)

LANL will create detailed finite element model(s) that capture appropriate geometry, materials, and operational load conditions of target test article(s). In addition, LANL will work with Partner to validate algorithm suite for robustness and uncertainty propagation on detailed finite element model(s). LANL will transfer algorithm suite into code suitable for embedding in firmware built by Partner. LANL will assist 3 Phoenix, Inc. in the production and delivery of one prototype system, and will continue development of both finite element models and shape reconstruction algorithm support with a special emphasis on establishing a production line of systems. LANL will assist in the production and delivery of one prototype system by conducting modeling and providing shape reconstruction implementation for a target tether/array. LANL will support the production and delivery of four (4) prototype systems by conducting modeling and providing shape reconstruction implementation for target tethers/arrays. LANL will host and setup a demonstration of a basic 25 meter shape reconstruction algorithm based on the design provided by the Partner. LANL will provide the fiber optic grating interrogator and computer support. LANL will provide test space to accommodate a surrogate tether (also provided by LANL) and integrate a fiber grating array LANL

will perform preliminary finite element analyses of a sonar array for the Sponsor.

NSF Facilities Renewal Grant

Charles H. Mielke (MPA-CMMS)

The Sponsor under a cooperative agreement with the National Science Foundation has established the National High Magnetic Field Laboratory (NHMFL) with facilities at Florida State University (FSU), University of Florida (UF) and Los Alamos National Laboratory (LANL). The National High Magnetic Field Laboratory (NHMFL) activities at LANL are provided through this statement of work. LANL has been established as the site of the pulsed magnetic field research facilities for the National High Magnetic Field Laboratory Pulsed Field Facility (NHMFL-PFF). These facilities utilize the unique capabilities of the 1430 MVA power source for long pulse magnets. In addition, a 1.6 MJ capacitor driven short-pulse magnetic field facility has been established along with several superconducting magnet facility. A national user program for these facilities has been developed and supported.

Open Annotation Collaboration Phase 1: Data Model & Interoperability Specification, AXE/Zotero Integration, Scholarly Annotation Analysis

Herbert Van De Sompel (STBPO-RL)

The Open Annotation Collaboration project will define and begin laying the groundwork for deploying an advanced, standards and practice-based, scholarly-focused framework for sharing and exploiting annotations of digital resources. LANL will contribute to and initiate this effort with a systematic multi-perspective analysis of current annotation models, application designs and system architectures, done in concert with an examination of a broad range of scholarly practices and scholarly-focused use cases involving annotations. This analysis will inform the development of a shared annotation data model supportive of interoperable annotations, adaptable by existing systems, and rooted in scholarly practice. In parallel, and also informing the definition and development of our shared, interoperable data model of scholarly annotation, LANL will develop enhancements of existing open source annotation tools aimed at making them interoperable. The capstone deliverable of this initial project will be the public release with request for comments of an alpha-stage annotation interoperability specification, embedding our interoperable annotation data model and defining the

read annotation interfaces required to implement this data model in practice.

Process Hazard Analysis and Conceptual Design Review Support for ITER Organization

William Kirk Hollis (C-CDE)

The Sponsor is a major international research project with the goal of demonstrating 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.

Process Hazardous Analysis for the ITER Organization

R. Scott Willms (C-DO)

The Sponsor is a major international research project with the goal of demonstrating 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.

Pulse Resonance for Photo Electron Acceleration

William Thomas Roybal (AOT-RFE)

The Sponsor has developed a resonant cavity technology that simultaneously energizes tens of harmonic modes whose fields superimpose to create a periodic, on-axis, high-gradient, electric field pulse. The purpose of Phase I is to determine the feasibility of combining this pulse resonator technology with laser and photocathode technologies to create a novel electron gun with beneficial properties. Los Alamos National Laboratory has unique expertise, experience, and design tools that will help to determine the feasibility of the new design.

Removal Transport and Installation at IUCF of the 425 MHz LANL Klystron Test Station

William Allen Reass (AOT-RFE)

The proton delivery system (PDS) for the Low Energy Neutron Source (LENS) facility at IUCF will require 1.2 MW peak power, Litton L-5773 425 MHz klystrons to power the accelerator. Los Alamos has operational RF station with this klystron type. We will move one of these stations to Indiana University Cyclotron Facility (IUCF), interface it to a power supply they received

from LANL, recommission the RF system, and train IUCF personel on its use.

Rensselaer Polytechnic Institute

Patrick Talou (T-2)

LANL will coordinate the work performed by the Universities under the Advanced Fuel Cycle Initiative-Nuclear Energy University Program (AFCI-NEUP) #09-247, to improve the evaluation of nuclear data and uncertainties for the modeling and simulation program of the AFCI. It will also act as a link with the AFCI Nuclear Physics Group, which provides guidance on the nuclear data needs for the AFCI Nuclear Physics Group, which provides guidance on the nuclear data needs for the successful completion of the program.

Rochester Center for Bio Defense Modeling

Alan S. Perelson (T-6)

This project will develop new immune system models relevant to our body's ability to fight infectious diseases such as influenza.

SAGE

Bruce Barraclough (ISR-1)

LANL will participate in the development of a Concept Study Report for NASA New Frontiers Surface and Atmosphere Geochemical Explorer (SAGE) proposal.

Solution Reactor Support

Steven K. Klein (N-2)

The Los Alamos National Laboratory (LANL) will perform specific activities in support of development of a solution reactor for the production of Mo99 specifically related to evaluation of FETCH modifications.

Stage Sequencing Project

John Chris Detter (B-6)

Based on an 80kb average genome size at 65% GC content for each phage, 454 and Illumina sequencing will be carried out for each of the 24 genomes. Depending on the time and the finishing process, JGI-LANL may have to prepare libraries for Sanger sequencing instead of doing 454 and Illumina. If Sanger sequencing is carried out, four 384-well plates will be draft sequenced for each phage. This means that two forward plates and two reverse plates (for a total of four 384-well plates) will be sequenced. Un-annotated draft sequence data will be provided to HHMI SEA Institution participants as the sequencing is completed. HHMI student institutions will release the draft and finished annotated sequences to GenBank. The Sponsor will send purified mycobacterium phage purified genomic DNA for draft sequencing and finishing to Joint Genome Institute (JGI)-LANL according to the following schedule of 12 phage genomes in FY09. Draft will need three 384-well plates sequenced in both the forward and

reverse directions. The total number of 384-well plates draft sequenced for each phage will be six based on a 75kb genome size. JGI-LANL will perform capillary sequencing on approximately 27.6.K lanes in FY09. Draft data, unannotated, will be provided to Science Education Alliance (SEA) participating institutions as the sequencing is completed. SEA participating institutions will release the draft and finished annotated sequences to GenBank.

Stand Off Radiation Detection Systems (SORDS)

Shawn Robert Tornga (ISR-1)

The first task area will involve analytical modeling and simulation in support of system design, optimization, development, and effective use. In this area LANL will develop a comprehensive simulation and modeling system to represent the physical and instrumental characteristics relevant to the combined coded aperture / Compton imaging detector system. The second task area involves development, optimization, evaluation, and testing of algorithms to be used for analysis and interpretation of Stand Off Radiation Detection Systems (SORDS) measurements. In this area LANL will use data from the simulation and modeling system of Task Area 1, and eventually experimental data from SORDS, to design, develop, and optimize algorithms to analyze SORDS data products.

Strategies for Eliciting bnAbs against Conserved HIV-1 Quaternary Epitopes

Sandrasegaram Gnanakaran (T-6)

Utilize computational methods to structurally characterize quaternary epitopes in HIV. Structural analysis of unliganded gp120 trimer will be carried using molecular modeling, molecular dynamics simulations and enhanced sampling methods.

Structural Gemonics of Persistance Targets from M Tuberculosis

Thomas Charles Terwilliger (INST-OFF)

LANL will carry out protein expression and purification as part of the TB Structural Genomics Consortium pipeline.

Support for Scanning Arm Cloud Radars (SACRS)

Kim Leonard Nitschke (EES-14)

The work to be performed provides ProSensing, a private Instrument Engineering firm, with consultative services in the areas oflogistical operations, project coordination and engineering oversight. ProSensing is recognizing Field Instrument Deployments and Operations (FIDO) consultative expertise wish to engage the FIDO Office to provide support for the installation and commissioning ofscanning cloud radars that they are supplying to DOE Atmospheric Radiation Measurement (ARM) Program field

locations.

Support for Swedish Nuclear Waste Repository

Scott Leroy Painter (EES-16)

The work will support the Sponsor's ongoing efforts to seek a construction authorization license for an underground repository for used commercial nuclear fuel near Osthammer, Sweden (Forsmark site). Los Alamos National Laboratory (LANL) will perform computer simulations of radionuclide transport in engineered barrier systems and in the surrounding geologic formation, and will contribute to the Sponsor reports that will be delivered to the Swedish Radiation Authority as part of a license application. Existing Sponsor computer codes will be used in the work. The simulations will address various sensitivities, including, but not limited to, the role of shoreline migration in dispersing radionuclides on the timeframe of 1 million years, the effect of future glaciation cycles on repository performance, and the effect of various modeling assumptions.

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

Kevin L. Mitchell (C-PCS)

The goal of this project is to 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. Lockheed Martin Space Systems Company (LMSCC) desires to expand its current understanding of the challenges, strengths, and best utilities of these technologies and LANL will provide technology implementation comparisons based on their past experiences with analyzing, building, and operating these systems.

The Environmentally Friendly Drilling Systems Program

Enid Joan Sullivan (C-CDE)

This project will bring to end users research and technical expertise in Environmentally Friendly Drilling (EFD) technologies, including geophysical methods, sensors, microdrilling, risk assessment, modeling and cost analysis, and produced water treatment and reuse.

Thorium-Cerium Fuel Pellets

Robert S. Holbrook (CAO-PF)

LANL will begin to study the process optimization for making thorium cerium oxide (ThOx-CeOx) fuel pellets including the co-milling, binder free processing, and sintering in air. The goal is to achieve a 94 percent theoretical density pellets with uniform micron size pore distribution. The optimized processing will be used to prepare pellets with at least three different compositions (5, 10, and 15 percent CeO2).

Tritium Resistance of Polyimide Membranes

R. Scott Willms (C-DO)

The Tritium Separation Centre (TSC) is an Nuclear Physics Institute project aimed at providing a facility for CANDU reactors (The CANDU reactor is a pressurized heavy water reactor developed initially in the late 1950s and 1960s by a partnership between Atomic Energy of Canada Limited (AECL), the Hydro-Electric Power Commission of Ontario (now known as Ontario Power Generation), Canadian General Electric (now known as GE Canada), as well as several private industry participants.) to process tritiated heavy water on-site. The TSC is comprised of several processes, most of which are well established in the detritiation field. A major process in the TSC is the gaseous diffusion process (GD). Gaseous diffusion has been well established in heavy isotope separation. In the Sponsor's TSC, traditional GD is modified several ways including the use of polymer-based membranes.

Distinguished Awards for 2010

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.

2010 Award Winner

The 2010 Distinguished Patent Award goes to the patent titled "Three-Dimensional Imaging at Nanometer Resolution", submitted by James H. Werner, Peter M. Goodwin, and Andrew P. Shreve of MPA-CINT (Center for Integrated Nanotechnologies). This patent is an apparatus and method for enabling precise, 3-dimensional, photoactivation localization microscopy (PALM) using selective, two-photon activation of fluorophores in a single z-slice of a sample in cooperation with time-gated imaging for reducing the background radiation from other image planes to levels suitable for single-molecule detection and spatial location, are described.

Werner, Goodwin, and Shreve have significantly advanced photoactivation localization microscopy by applying their knowledge and experience gained over years of effort on single-molecule detection. Their system incorporates selective, two-photon activation flourophores in concert with time-gated imaging to reduce background radiation and to achieve three-dimensional imaging at nanometer resolution.

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.

2010 Award Winner

The 2010 recipient of this award is Dr. Dipen Sinha of the Materials Physics and Applications (MPA) Division. His extensive body of work in acoustic technologies

spans several decades and has been applied in numerous application areas, ranging from biomedicine to oil and gas exploration. Dr. Sinha's capabilities and technologies are widely recognized by industry, government, and other researchers throughout the world.

Dr. Sinha's dedication to this field of research has resulted in six (6) commercial license agreements; eleven (11) collaborative projects; three (3) Sponsored Research Agreements; three (3) User Facility Agreements; and forty-one (41) new invention disclosures, eighteen of which have been issued as U.S. patents thus far. Furthermore, two northern New Mexico startup companies have formed around Dr. Sinha's portfolio of work, providing benefit to the regional economy.

For many years he has been actively and consistently engaged in the commercialization process and is frequently sought out by industry as a leader in his field with proven experience in moving technologies from the laboratory to the marketplace. Currently, Dr. Sinha's portfolio of Swept Frequency Acoustic Interferometry (SFAI) technology is being commercialized for use in a variety of applications, including multi-phase characterization of oil and gas production wells. His exemplary work sets a standard of excellence in support of the Laboratory's technology transfer mission.

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.

2010 Award Winners

Harshini Mukundan, Basil Swanson, Aaron Anderson, and Kevin Grace, all of whom reside in C-CPS, are this year's recipients of the Programmatic Impact Award for their efforts in the optical waveguide platform to accurately identify disease.

One of the missions of Los Alamos National Laboratory is to ensure national security by detecting and eliminating biological threats. LANL has teams working with domestic and international partners toward understanding the biomarkers associated with tuberculosis, which

affects one third of the world's population. Previously, tuberculosis has been hard to diagnose early, and the methods used to diagnose it are known to be invasive. Understanding these biomarkers not only makes the disease easier to identify, but also increases the accuracy of the prognosis. The system also improves several of the major attributes required to be a robust field-deployable device including portability, short time for results, and high specificity.

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.

2010 Award Winner

The 2010 Distinguished Copyright Award is presented to the Computational Fluid Dynamics code, "KIVA-4mpi," copyrighted by David Carrington and David Torres of the Fluid Dynamics And Solid Mechanics Group (T-3).

This Computational Fluid Dynamics (CFD) software predicts complex fuel and air flows as well as ignition, combustion, and pollutant-formation processes in engines. The KIVA models have been used to understand combustion chemistry processes, such as auto-ignition of fuels, and to optimize diesel engines for high efficiency and low emissions. The software was able to reduce development time and cost by 10%–15% in developing its high-efficiency 2007 ISB 6.7-L diesel.   The company was able to design a more robust engine, with improved fuel economy, as well as meet all environmental and customer constraints. KIVA-4mpi, the latest addition to the KIVA series of codes, introduces parallel processing capability, dramatically improving performance and assuring LANL's continued reputation as an expert in internal combustion engine modeling.

T-3 and TT have successfully partnered with industry to transfer KIVA to numerous federal, state, and local governments, as well as universities and private businesses. Currently, KIVA is used by hundreds of institutions, including the Big Three U.S. auto makers, Cummins, Caterpillar, and various federal laboratories.

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.

2010 Award Winner

The 2010 Regional Impact Award is given to Michael Caffrey and Joseph Palmer for the Adaptive Bit Rate Radio. Michael Caffrey was the principal investigator for the Adaptive Radio project and, with the help of $100k in Laboratory Venture Acceleration Funding, took a license and spun-out Adaptive Radio Technologies in order to commercialize the invention. Dr. Joseph Palmer was co-investigator for the LANL Adaptive Radio project; he developed the key techniques that enable the adaptive radio.

The Adaptive Bit Rate Radio, marketed as the Firehose Communications System, is a ground-breaking satellite communications system for space, weight, and power-constrained applications. This system, conceived at LANL and licensed by Adaptive Radio Technologies, uses a new waveform to increase communications bandwidth 10x or more without a corresponding increase in power demand.

The distance from the satellite to the ground station has a significant impact on the power of the received signal. Most satellite radios are conservatively designed so as to minimize communications loss; however, this also results in power inefficiency. LANL's Adaptive Bit-Rate Radio provides an order of magnitude greater data down-link capacity for Low Earth Orbit satellites over conventional radios for the same power, volume and mass, because it adapts the signal characteristics to minimize energy expenditure. This translates into greater energy efficiency since the energy consumed is constant. The added system complexity occurs on the ground station where resources are not as constrained.

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**

Hey, What About My Bright Idea?

www.lanl.gov/my_idea

ideas
invention disclosure
electronic application system

LOS ALAMOS NATIONAL LABORATORY
Technology Transfer Division

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 (Acting)
David Pesiri, 665-7279

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/