

# **SBIR / STTR FISCAL YEAR 2009 PHASE II AWARDS**

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## TOPIC: INSTRUMENTATION FOR NEUTRON SCATTERING, ELECTRON MICROSCOPY, AND SCANNING PROBE MICROSCOPY

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**STTR Project**

**Company:**

Anasys Instruments Corp.  
25 W. Anapamu St.  
Suite B  
Santa Barbara, CA 93101-5151

**Title:**

Chemical Infrared Spectroscopic Imaging with Nanometer Spatial Resolution Using Atomic Force Microscopy

**Summary:**

The goal of this project is to use AFMs to perform chemical analysis on samples via IR spectroscopy at a resolution of sub-30nm. Successful realization of this goal would impact every American industry that relies on scientific research at the nano-scale with the most prominent examples being the Multi-Billion industries of Materials and Pharmaceuticals.

**STTR Project:**

**Company:**

Cryogenic Applications F, Inc.  
450 Bacon Springs Lane  
Clinton, TN 37716-5311

**Title:**

Development and Neutronic Validation of Pelletized Cold and Very Cold Moderators for Pulsed Neutron Sources

**Summary:**

The Spallation Neutron Source produces intense beams of cold neutrons for scientific research. The proposed research will lead to a more efficient beam line component which could double the output of cold neutrons at a few percent of the original cost.

**Company:**

Hummingbird Scientific, LLC  
8300 28th Court NE Unit 200  
Lacey, WA 98516

**Title:**

Nanoscale Imaging of Solid-State Energy Conversion Processes at the Solid-Liquid Interface Using Real Time Transmission Electron Microscopy

**Summary:**

Currently, direct observation in real-time of microscopic electrochemical processes for the creation and storage of energy is hindered by limitations of current specimen holders for electron microscopes. This project proposes to develop and commercialize a prototype fluid specimen holder to give researchers radically improved methods for studying energy for better understanding of energy generation and storage processes at the molecular scale. This in turn should facilitate micro-miniaturization of current energy devices such as batteries and fuel cells, as well as the discovery of alternative energy sources.

**Company:**

Parallax Research, Inc.  
P.O. Box 12212  
Tallahassee, FL 32317

**Title:**

Parallel Data Collection Wavelength Dispersive X-Ray Spectrometer for Use on Scanning Electron Microscopes

**Summary:**

We will develop a new type of high performance x-ray spectrometer for use on electron microscopes for measurement of elements in small features. This spectrometer will provide much faster analysis than competing systems.

**Company:**

Proportional Technologies, Inc.  
8022 El Rio Street  
Houston, TX 77054-4184

**Title:**

High Rate Large Area Enriched Boron Neutron Detector for SNS

**Summary:**

The Spallation Neutron Source (SNS) facility will push available thermal neutron flux at least an order of magnitude and drastically improve neutron scattering capabilities but high neutron flux intensity places severe demands on imaging instrumentation and many target stations have no acceptable detector selection. A novel detector technology based on boron coated straw detectors and economical methods of manufacturing will be developed providing a solution to this problem as well as to the problem of large scale deployment of neutron detection portal monitors to make our nation safer from the terrorist threat imposed by smuggling of plutonium.

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**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

High Performance Neutron Detector

**Summary:**

The high performance superconducting radio frequency accelerators needed to explore the frontiers of particle physics require high purity, chemically treated surfaces. The new, acid-free electro-polishing methods developed in this project will facilitate implementation of environmentally friendly, "Green" production methods and result in significant cost savings.

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**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Virtual Instrumentation Experiment Optimization for High-Throughput Scientific Analysis

**Summary:**

By providing user-friendly Leadership Computing Facility access, neutron facility users will more rapidly transform their raw data into scientific results and discovery in the fields of advanced materials, biological systems, energy, and national security. The software tools produced by this Orbiter project will significantly help users provide better results sooner for complex systems.

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**STTR Project:****Company:**

Xemed, LLC  
16 Strafford Avenue  
Durham, NH 03824

**Title:**

Ex-situ Polarized  $^3\text{He}$  Neutron Spin Filter and Analyzer

**Summary:**

The proposed technology for producing large quantities of nuclear polarized  $^3\text{He}$  gas can serve dozens of experiments at the Spallation Neutron Source in Tennessee and at Los Alamos. This project would allow investigations into the magnetic structures of thin films and offer synergistic benefits for diagnostic medical imaging of lung function.

**TOPIC: TECHNOLOGY TO SUPPORT BES USER FACILITIES**

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**Company:**

Creare Incorporated  
16 Great Hollow Road  
P.O. Box 71  
Hanover, NH 03755-0071

**Title:**

A Magneto-Hydrodynamic System for Generating High-Pressure Impluses in Spallation Targets

**Summary:**

A system is being developed to model and analyze the mechanisms behind wall erosion on the Spallation Neutron Source target. This work will help enable the facility, which is used for materials science research, to operate at higher efficiency and lower cost.

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**Company:**

Q-Peak, Incorporated  
135 South Road  
Bedford, MA 01730-2307

**Title:**

A Mid IR Ultrafast Laser System for High Field Physics

**Summary:**

Revolutionary advances in fundamental studies of atoms, molecules and solids have been made possible by development of ultra-high-power, ultra-short pulse lasers and associated optics to generate intense X-ray pulses. Spin-off applications of the advances cover a wide and diverse area, ranging from diagnostic medicine to remote detection of hidden explosives and other weapons of mass destruction. Our program will make a significant advance in the laser technology needed for the next generation of ultrafast X-ray systems, and will also reduce their cost and complexity.

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**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA02472-4699

**Title:**

Advanced Scintillation Detector for Synchrotron Facilities

**Summary:**

The development of the scintillator proposed here will enable the full potential of current state-of-the-art X-ray detectors, which is critical for basic research at synchrotron sources. Other areas benefiting from this technology are medical imaging, Xray scanning equipment at airports and border control, detectors for homeland security, and small animal research, which is so important for the development of new drugs in a rapid and cost effective manner.

## TOPIC: ACCELERATOR TECHNOLOGIES FOR PRESENT AND FUTURE ACCELERATOR FACILITIES

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**Company:**

Advanced Energy Systems, Inc.  
27 Industrial Blvd, Unit E  
Medford, NY 11763-2286

**Title:**

Improved Superconducting Accelerator System for Next Generation Light Sources

**Summary:**

Modern synchrotron light sources place ever higher demands on SRF acceleration to achieve peak performance. We will complete the detailed design of an advanced SRF system to meet these demanding specifications. This advanced design will put a US industrial firm in the global marketplace currently dominated by foreign suppliers.

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**Company:**

Advanced Energy Systems, Inc.  
27 Industrial Blvd, Unit E  
Medford, NY 11763-2286

**Title:**

High Power Fundamental Power Coupler for Next Generation Light Sources

**Summary:**

We propose developing a High Power Fundamental Coupler for third generation light sources such as the BNL NSLS-II. Technology developed from this effort will have application to fourth and higher generation light sources as well as high current/high power accelerators of the future.

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**Company:**

Niowave, Inc.  
1012 N. Walnut Street  
Lansing, MI 48906

**Title:**

Development of a Superconducting RF 1.5 GHz Landau Cavity for Synchrotron Light Sources

**Summary:**

We plan to collaborate on the development of superconducting 1.5 GHz Landau cavities that will greatly increase the beam lifetime of future light sources such as the NSLS-II. This research would lead to a domestic supplier of superconducting RF cavities for existing and planned light sources.

## TOPIC: ADVANCED COAL RESEARCH

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**Company:**

Materials and Systems Research, Inc.  
5395 West 700 South  
Salt Lake City, UT 84104

**Title:**

Advanced Coal Research - Sealing Systems for High Temperature SOFC

**Summary:**

This project will provide a viable sealing option for planar solid oxide fuel cells providing an impetus to commercialization of these green and energy efficient power sources.

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**STTR Project:****Company:**

Resonon, Inc.  
619 N. Church Avenue  
Suite 3  
Bozeman, MT 59715-3087

**Title:**

Hyperspectral Sensor for Large-Area Monitoring of Carbon-Dioxide Reservoirs and Pipelines

**Summary:**

This effort will provide a technology to monitor leakage from carbon sequestration sites and pipelines. The proposed

system utilizes natural vegetation as a massive sensor array by identifying plant stress caused by exposure to elevated levels of underground carbon-dioxide.

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**Company:**

TDA Research, Inc.  
12345 W. 52nd Avenue  
Wheat Ridge, CO 80033-1916

**Title:**

Novel Sorbents for Removal of Mercury, Arsenic, Sulfur and Halides from Coal-Derived Synthesis Gas

**Summary:**

The liquid fuels produced by FT synthesis using synthesis gas derived from coal can provide an immediately viable alternative to crude oil required to help provide energy independence to the U.S. The newly developed gas clean-up process offers several key benefits that can increase the cost effectiveness of the FT process.

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**Company:**

Vista Photonics, Inc.  
67 Condesa Road  
Santa Fe, NM 87508-8136

**Title:**

Large Area Leak Sensor for Sequestered Carbon Dioxide

**Summary:**

Inexpensive high-performance sensors are required in the field to detect leaks of carbon dioxide from permanent geologic storage sites. The prototype laser sensor technology will provide the required measurements for an exceptional value.

**TOPIC: MATERIALS FOR ADVANCED NUCLEAR ENERGY SYSTEMS**

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**Company:**

Physical Sciences Inc.  
20 New England Business Center  
Andover, MA 01810

**Title:**

Impermeable SiC Composites

**Summary:**

Development of impermeable high temperature composite technology will enable the nation to develop leap frog nuclear power technology and high performance gas turbines, reducing the nation's dependence on foreign energy supplies and helping protect the environment. Leadership in high temperature materials technology will allow American manufacturers to maintain global leadership in gas turbine technology and improve our balance of trade.

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**Company:**

Transition45 Technologies, Inc.  
1963 North Main Street  
Orange, CA 92865-4101

**Title:**

Advanced Nb-based Intermetallics for Nuclear Applications

**Summary:**

Niobium-based intermetallics are innovative advanced materials that are among the closest to replacing superalloys in very high temperature applications. The successful development and implementation of these alloys may revolutionize technology by allowing for much higher temperature operating conditions for nuclear systems as well as industrial gas turbines and aircraft engines.

**TOPIC: SOLID STATE ELECTROLYTE DEVELOPMENT FOR  
ADVANCED ENERGY STORAGE DEVICES**

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**Company:**

Enogetek Inc.  
2055 Albany Post Road  
Suite AT-6  
Croton-on-Hudson, NY 10520-1156

**Title:**

High Performance Hydroxyl Conductive Membrane For Advanced Rechargeable Alkaline Batteries

**Summary:**

Successful completion of the current program will make a significant contribution toward development of the key energy storage system that can make the utilization of alternative energy more practical and stable. The technology could also be used in HEV and PHEV to improve the energy efficiency of the vehicles.

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**Company:**

Excellatron Solid State, LLC  
263 Decatur Street  
Atlanta, GA 30312-1705

**Title:**

Novel Solid State Electrolyte Development

**Summary:**

Further development of rechargeable lithium batteries requires dramatic improvement of the ionically conducting organic electrolyte presently used in the batteries. This project will develop a novel solid state electrolyte prepared by a sol gel technique that will improve lithium battery capabilities and safety, making the lithium batteries adequate for high energy applications such as electric vehicles.

**Company:**

NEI Corporation  
400 Apgar Drive  
Suite E  
Somerset, NJ 08873

**Title:**

Membranes for Solid State Lithium Batteries

**Summary:**

A solid electrolyte membrane technology is being developed that will enable a new generation of cost effective lithium-ion batteries with improved safety and energy storage capacity.

**TOPIC: MATERIALS FOR ADVANCED COOLING APPLICATIONS**

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**Company:**

Hi-Z Technology  
7606 Miramar Road, Suite 7400  
San Diego, CA 92126-4210

**Title:**

Study of the Use of Quantum Well Thermoelectrics for Truck Air Conditioning

**Summary:**

A solid-state cooling device which is free of environmentally harmful refrigerant gases and powered by truck exhaust is being developed. Phase 1 of the program demonstrated through a working model that solid-state Thermoelectrics could be used in a cooling system to cool truck cabs.

**Company:**

NEI Corporation  
400 Apgar Drive  
Suite E  
Somerset, NJ 08873

**Title:**

Enhancing the Heat Exchanger Performance Through the use of Durable Superhydrophobic Surface Treatment

**Summary:**

The proposed program to implement a nanotechnology-based surface treatment on industrial vapor-to-liquid heat exchangers has the potential to enhance the performance of heat exchangers by an order of magnitude, thereby improving the energy efficiency of industrial processes, including power generation through renewable and non-renewable energy source.

**Company:**

TIAX, LLC  
15 Acorn Park  
Cambridge, MA 02140-2301

**Title:**

Heat Activated Metal Hydride Refrigeration Cycle

**Summary:**

Roughly two-thirds of the fuel used in electric power plants to generate electricity is wasted in the form of dissipated heat. This project will develop refrigeration technology which will make use of this heat to cool buildings or provide refrigeration for supermarkets and industry.

**TOPIC: SOLID-STATE LIGHTING**

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**Company:**

Universal Display Corporation  
375 Phillips Blvd.  
Ewing, NJ 08618

**Title:**

Enhanced WOLEDs Outcoupling Using Low Index Grids

**Summary:**

We will increase the conversion efficiency of electrical energy into light of white-organic-light-emitting devices and thereby enable replacement of inefficient conventional incandescent bulbs, which consume over 8% of the electricity produced by the United States. Our portfolio of technical expertise and infrastructure will enable the development of high efficiency solid state white lightening sources.

**TOPIC: CATALYSIS**

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STTR Project:

**Company:**

Compact Membrane Systems, Inc.  
335 Water Street  
Newport, DE 19804-2410

**Title:**

Removal Of Ammonia And Water To Enhance Yield Of Kinetically-Controlled Beta-Lactam Synthesis

**Summary:**

This program is a platform technology to enhance chemical synthesis and also dry organics including fuel grade ethanol from biomass.

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**Company:**

KSE, Inc.  
665 Amherst Road  
Sunderland, MA 01375-9420

**Title:**

Acetic Acid Manufacture by the Selective Photocatalytic Oxidation of Ethylene

**Summary:**

Acetic acid is a large volume commodity chemical that is a vital building block in the U.S. chemical industry. Current production technologies are inefficient. The proposed technology will cut energy consumption in half, reduce greenhouse gas emissions, improve efficiency of use of hydrocarbons, reduce dependence on foreign oil, and improve U.S. employment in the chemical industry.

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**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840

**Title:**

Improved Heterogeneous Catalyst for the Production of Biodiesel

**Summary:**

This Phase II SBIR project involves the development of a new catalyst to cost-effectively transform renewable sources of energy such as plant oils to biodiesel. The development of this technology will reduce the country's dependence on foreign oil and result in a net decrease in carbon dioxide emissions.

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**Company:**

Materials & Electrochemical Research (MER)  
7960 S. Kolb Road  
Tucson, AZ 85766

**Title:**

An Innovative Triple Function Cathode for MEMS Fuel Cells

**Summary:**

This project proposes using a single material for use in miniature electric power sources that replaces three materials used in conventional fuel cells thus simplifying their assembly and reducing their cost. This improved miniature fuel cell system provides more power for longer to portable electronics while reducing the quantity of toxic battery materials.

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**Company:**

TDA Research, Inc.  
12345 W. 52nd Avenue  
Wheat Ridge, CO 80033-1916

**Title:**

Novel Catalytic Ammoxidation Process

**Summary:**

Acrylonitrile is an important chemical intermediate for producing acrylic fibers, synthetic rubber and other polymers. Current catalysts operate at high temperatures and generate large quantities of unwanted byproducts. The new catalyst produces more acrylonitrile, less byproducts, can be used in existing petrochemical plants, and will increase the energy efficiency of acrylonitrile manufacture.

## TOPIC: CHEMICAL REACTIONS AND SEPARATION PROCESSES FOR BIOREFINERY APPLICATIONS

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**Company:**

KSE, Inc.  
665 Amherst Road  
Sunderland, MA 01375-9420

**Title:**

Reduction in Distillation Usage in the Manufacture of Biomass Ethanol by Reactive Water Separation

**Summary:**

The production of ethanol from biomass can become an important source of transportation fuels, reducing the need for imported oil and enhancing U.S. employment. The proposed program substitutes a novel technology for the energy-intensive ethanol dehydration steps now used in fuel grade ethanol production. It offers major reduction in the energy consumption for ethanol manufacture, at the reduced costs needed for cellulosic biomass use.

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**Company:**

Trillium FiberFuels, Inc.  
33898 SE Eastgate Circle  
Corvallis, OR 97333-2248

**Title:**

Xylose Utilization for Ethanol Production Enabled by a Parallel Microfiber Reactor with Immobilized Xylose Isomerase

**Summary:**

Greatly increased supplies of sustainable liquid fuels such as cellulosic ethanol are clearly needed in the U.S. We have developed a novel process that enables the fermentation of xylose via an enzymatic conversion - resulting in higher-yield, lower-cost processing of cellulosic ethanol as a replacement for gasoline.

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**Company:**

United Environment & Energy LLC  
111 Ridge Road  
Horseheads, NY 14845-1507

**Title:**

Structured Catalyst for Biodiesel Production

**Summary:**

Although interest in biodiesel is rapidly increasing, the process by which biodiesel is synthesized has not changed much in the last two decades and is far from being efficient. This project aims to develop a high efficiency, high productivity, and low cost biodiesel production technology.

## TOPIC: TECHNOLOGIES RELATED TO ENERGY STORAGE FOR HYBRID AND PLUG-IN HYBRID ELECTRIC VEHICLES

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**Company:**

MMaxPower, Inc.  
141 Christopher Lane  
Harleysville, PA 19438

**Title:**

Development of High Temperature Melt Integrity Separators for Lithium-Ion Cells

**Summary:**

During high power use and abuse situations, a battery can become quite hot causing the internal separator to fail, possibly resulting in explosion and fire. Electro-spinning technology is being used to create robust separators that will withstand higher temperatures before failure, significantly increasing lithium-ion battery safety.

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**Company:**

Policell Technologies, Inc.  
160 Liberty Street, Building #4  
Metuchen, NJ 08840

**Title:**

Development of High Temperature Melt Integrity Separators for Lithium-Ion Cells

**Summary:**

Commercial separator products shrink at high temperatures. This shrinking problem could cause an internal short-circuit of batteries. This safety problem is delaying the introduction of lithium-ion batteries into large format systems such as hybrid electric vehicles. This project will develop separators that are thermally stable for making safe batteries.

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**Company:**

TIAX, LLC  
15 Acorn Park  
Cambridge, MA 02140-2301

**Title:**

High Voltage Electrolyte for Lithium-Ion Cells

**Summary:**

Technology is being developed to improve performance and reduce costs of batteries for PHEVs and HEVs, which will make these vehicle technologies more commercially viable, and thus increasing the likelihood that they will yield their potential environmental, economic and political benefits.

## TOPIC: NANOTECHNOLOGY

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**Company:**

NEI Corporation  
400 Apgar Drive  
Suite E  
Somerset, NJ 08873

**Title:**

Self-Healing Polymeric Coatings: Beyond Scratch-Healing

**Summary:**

A nano-composite self-healing coating technology is being developed to significantly enhance the operational life of industrial coatings, thereby greatly reducing maintenance cost.



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**Company:**

nGimat Co.  
5315 Peachtree Industrial Blvd.  
Atlanta, GA 30341

**Title:**

Nano-Engineered Anodes for Lithium-ion Batteries

**Summary:**

The goal of this project is to develop a critical energy storage component of Lithium-ion batteries that will power the next generation of Hybrid Electric Vehicles & off-grid energy storage facilities for the commercial and military sectors. Automobiles powered by batteries containing this component will reduce our dependence on foreign oil & batteries, reduce harmful emissions and strengthen global competitiveness of the US battery & automobile industries.

**TOPIC: ALTERNATIVE FEEDSTOCKS**

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**Company:**

Chesapeake PERL, Inc.  
8510A Corridor Road  
Savage, MD 20763

**Title:**

Identification, Production and Characterization of Novel Lignase Proteins from Termites for Depolymerization of Lignocellulose

**Summary:**

Termites have solved the problem blocking efficient biofuel production from switch grass, corn stover, and wood pulp; they can degrade lignin and hemicellulose, the chemicals which interfere with ethanol fermentation. This project is identifying key termite enzymes, and developing ways to produce them for manufacturing next generation biofuels.

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**Company:**

Plant Sensory Systems, LLC.  
6204 Blackburn LaneM  
Baltimore, MD 21212

**Title:**

Increased Seed Oil by Metabolic Regulation

**Summary:**

Increased oilseed productivity per acre is needed to help meet the biodiesel demand. The proposed research will move a novel gene construct into canola to function as a master switch to increase seed oil content.

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**Company:**

Suganit Systems Inc.  
10903 Hunt Club Road  
Reston, VA 20190-3912

**Title:**

Feasibility of Commercialization of a Pre-Pretreatment Process for Enhanced Biomass Saccharification

**Summary:**

Pretreatment of biomass plays a critical role in the ability to convert cellulosic biomass to fuels and chemicals. This phase II research and development addresses the development of a pretreatment technique that has allowed successful production of ethanol and other chemicals from biomass.

**TOPIC: ATMOSPHERIC MEASUREMENT TECHNOLOGY**

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**Company:**

Aerodyne Research, Inc.  
45 Manning Road  
Billerica, MA 01821-3976

**Title:**

Characterization of Particulate Organic via Combined Thermal Desorption Aerosol Gas Chromatography and Aerosol Mass

**Summary:**

Small airborne particles generated from energy-related activities can adversely impact global climate, human health, and visibility. We propose to develop an instrument with unique capabilities for identifying and measuring the organic constituents of aerosol particles, leading to a better understanding of the sources, transformations, and fates of organic atmospheric particulate matter.

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**STTR Project:****Company:**

Aerosol Dynamics, Inc.  
935 Grayson Street  
Berkeley, CA 94710-2640

**Title:**

An In-Situ Instrument to Assess the Concentration and Phase Partitioning of Atmospheric Semi-Volatile Organic Compounds

**Summary:**

Semi-volatile organic compounds are pervasive in the environment, in urban air, and in the global atmosphere, yet are poorly characterized. The proposed instrument will measure these compounds with hourly time resolution to increase knowledge of sources, formation mechanisms and effects on our environment.

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**Company:**

Boulder Environmental Sciences and Technology  
4425 Hastings Drive  
Boulder, CO 80305

**Title:**

Profiling Radiometer for Atmospheric and Cloud Observation (PRACO)

**Summary:**

We will build a working prototype of PRACO, a new tool for cloud observation. Some socio-economic benefits that PRACO's reliable forecasting will provide are improved civil government, industrial and military planning, increased natural hazard mitigation, response, and recovery, and hedging against uncertainty.

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**Company:**

ProSensing, Inc.  
107 Sunderland Road  
Amherst, MA 01002-1098

**Title:**

High Resolution Millimeter Wave Radar-Radiometer System for Volume Imaging of Clouds

**Summary:**

The role of clouds in regulating incoming solar radiation and upwelling infrared radiation is a poorly understood factor affecting global climate. This project will develop a high resolution scanning cloud radar designed specifically to test cloud model predictions.

**TOPIC: GENOMES-TO-LIFE (GTL) AND RELATED BIOTECHNOLOGIES**

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**Company:**

Pharyx, Inc.  
49 Hemenway St #3  
Boston, MA 02115

**Title:**

Microbioreactor Technology for Obligate Anaerobes

**Summary:**

Anaerobes are the source of industrially useful products such as liquid biofuels. Because they are sensitive to oxygen, these organisms are very difficult to culture. We are developing compact, easy-to-use, disposable devices for culturing anaerobes, which would provide a great benefit to industries that are dependent on culturing anaerobes.

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**Company:**

Tetragenetics, Inc.  
95 Brown Road  
Ithaca, NY 14850

**Title:**

Overexpression and Rapid Purification of Membrane and Secretory Proteins in Tetrahymena

**Summary:**

Genetically engineered proteins have become increasingly important in a wide range of applications that extend from alternative fuel production to the treatment of human and animal disease. This project is aimed at the development of new technologies for rapid production of these proteins at the lowest possible cost.

**TOPIC: CARBON CYCLE MEASUREMENTS OF THE ATMOSPHERE AND THE BIOSPHERE**

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**Company:**

Aerodyne Research, Inc.  
45 Manning Road  
Billerica, MA 01821-3976

**Title:**

Dual Laser Isotopic Flux Monitor for Carbon Dioxide and Water Vapor

**Summary:**

The increasing concentration of carbon dioxide in the Earth's atmosphere must be understood since carbon dioxide is the key driver of global warming. This novel instrument will quantify the sources and sinks of carbon dioxide by rapidly measuring the concentrations of the stable isotopes of both carbon dioxide and water.

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**Company:**

Atmospheric Observing Systems, Inc.  
1930 Central Avenue  
Suite A  
Boulder, CO 80301-2895

**Title:**

The Ratiometric NDIR Analyzer for Robotic Platforms

**Summary:**

We are developing CO2 technology intended to produce a new data product, CO2 Weather. CO2 Weather will provide scientists with greater spatial resolution CO2 data and likewise inform individual American citizens on the environmental impacts of their daily lives and our predominant form of energy production.

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**Company:**

LI-COR Biosciences  
4421 Superior Street  
Lincoln, NE 68504-1395

**Title:**

A Closed-Path Methane and Water Vapor Gas Analyzer

**Summary:**

We propose to develop an economical, robust, and reliable methane and water vapor gas analyzer capable of long-term measurements in remote areas for climate change and environmental research. Such measurements are essential for quantifying the amount of CH4 released from various ecosystems (wetlands, rice paddy and forest etc) and other surface contexts (e.g. landfills, animal husbandry lots etc.), understanding dynamics of atmospheric methane budget and their impact on climate change and global warming.

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**Company:**

Vista Photonics, Inc.  
67 Condesa Road  
Santa Fe, NM 87508-8136

**Title:**

Price-Protected High-Precision Carbon Dioxide Analyzer

**Summary:**

Inexpensive high-performance carbon dioxide sensors are required in the field to understand global warming. This project's commercialized laser sensor technology will provide the required measurements for an exceptional value.

## TOPIC: TECHNOLOGIES FOR SUBSURFACE CHARACTERIZATION AND MONITORING

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**STTR Project:****Company:**

Burge Environmental, Inc.  
6100 South Maple Avenue  
Suite 114  
Tempe, AZ 85283-2872

**Title:**

In-Situ Monitoring of Uranium in Ground Water Using a Colorimetric-Based Sensor: Enabling the Mapping of Uranium Plume Migration of Contaminated DOE Sites

**Summary:**

A field-deployable monitoring system for the cost-effective and rapid determination of radioactive substances in the groundwater at federal sites, such as Hanford Site, Washington, will be developed. The development of the system will decrease the future cost of site remediation.

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**Company:**

Los Gatos Research  
67 East Evelyn Avenue  
Suite 3  
Mountain View, CA 94041

**Title:**

Field-Deployable Water Isotope Analyzer for Stream Sampling

**Summary:**

This project will develop a field-deployable analyzer to continuously monitor water sources and help provide information about the storage, flow pathways, and sources of water. Such measurements are critical to DOE's waste remediation efforts.

---

**Company:**

Vista Clara Inc.  
2615 W Casino Road, Suite 4-JK  
Everett, WA 98204

**Title:**

Surface NMR Instrumentation and Analysis Methods for Characterizing Vadose Zone Hydrology

**Summary:**

This project will develop a new magnetic resonance imaging instrument and analysis techniques to image and characterize groundwater and contaminant transport properties in the near subsurface. The technology developed through this program will be widely applicable to investigation and remediation of underground contamination and contaminated aquifers, groundwater resource development, and groundwater resource management.

## TOPIC: MEDICAL SCIENCES

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**Company:**

Molecular NeuroImaging, L.L.C.  
60 Temple Street  
Suite 8A  
New Haven, CT 06510

**Title:**

Development of Automated Software Program for the Analysis of Alzheimer's Disease Beta-Amyloid Scans

**Summary:**

We will apply the newly developed software, Objective and Generalized Tracer Evaluation (OGRE), to a prospective clinical study that will assess the utility of the advanced image processing package as an aid in the automated, early, and accurate diagnosis and monitoring of Alzheimer's patients.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

High Resolution Scintillators for SPECT

**Summary:**

The proposed project will investigate a novel detector technology that will be very useful in medical imaging. It will also be useful in other scientific studies (such as high energy physics and space research) as well as commercial applications (such as oil exploration, medical imaging, and non-destructive evaluation).

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

Advanced Detectors for PET

**Summary:**

The proposed research will investigate a promising detector technology that will have major impact in scientific studies, health care, homeland defense, oil exploration as well as industrial applications.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

Novel Approach for Depth-of-Interaction Encoding in PET

**Summary:**

The proposed project will investigate a novel detector technology that will be very useful in nuclear medicine studies. It will also be useful in other scientific studies (such as high energy particle physics and space research), homeland security as well as commercial applications (such as oil exploration and non-destructive evaluation).

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## TOPIC: WIND ENERGY TECHNOLOGY DEVELOPMENT

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**Company:**

AnemErgonics, LLC  
7015 Nile Court  
Arvada, CO 80007-7049

**Title:**

SMarT Tower Systems for Small Wind Turbines (Simple Modular Technology)

**Summary:**

This project seeks to simplify installation and reduce the cost of electricity for small wind turbines on monopole towers. This project will design, test, and market improved versions of its SMarT Tower system, including foundations.

---

**Company:**

Physical Optics Corporation  
20600 Gramercy Place  
Building 100  
Torrance, CA 90501-1821

**Title:**

Wind Resource Assessment Lidar

**Summary:**

The proposed technology provides a cost-effective tool to accurately and efficiently evaluate wind resource conditions at potential sites for future wind farms, enabled by rapid deployment and autonomous operational capabilities.

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## TOPIC: TRADITIONAL ENERGY EFFICIENT LIGHTING TECHNOLOGIES

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**Company:**

Acree Technologies Incorporated  
1900 Olivia Road  
Unit D  
Concord, CA 94520

**Title:**

Advanced Coatings to Improve the Efficiency, Color Rendering and Life of High Intensity Discharge Lamps

**Summary:**

This project will lead to a more efficient light that will save the United States over 40 TWh of energy per year. This will help reduce the United State's dependence on foreign energy sources and help achieve the DOE goal of developing energy efficient, high-quality lighting technologies by 2025 that can illuminate buildings using 50% less electricity compared to 2005 technologies.

---

**Company:**

PhosphorTech Corporation  
351 Thornton Road  
Suite 130  
Lithia Springs, GA 30122

**Title:**

Advanced Phosphor Technologies For Energy Efficient Lighting And Energy Harvesting

**Summary:**

Upconversion nanophosphors will initiate new paradigms in the conservation and generation of energy. Highly efficient lamp and solar cell technologies will be produced and revolutionize the US lighting and solar power industries, by providing competitive technologies that will significantly reduce global energy use and environmental pollution.

---

**Company:**

Surmet Corporation  
31 B Street  
Burlington, MA 01803

**Title:**

Selective Emitter Based Energy Efficient Incandescent Lamp Technology

**Summary:**

New high energy efficiency incandescent lamps based on our technology can produce substantial energy savings and attendant reduction in carbon emissions. We will develop a product that will have high acceptance from consumers and one that is suited for use in the 2 billion incandescent lamps sockets that exist in USA.

**TOPIC: GEOTHERMAL TECHNOLOGIES**

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**Company:**

Composite Technology Development Inc.  
2600 Campus Drive, Suite D  
Lafayette, CO 8002-3359

**Title:**

Improved High-Temperature ESP Motor Lead Extension Cables for Reliable Geothermal Power Production

**Summary:**

Geothermal energy is a viable, environmentally-clean alternative energy source under development through the U.S. Department of Energy. This effort aims to provide robust power cables to increase the reliable lifetime of the downhole equipment necessary for commercial-scale geothermal energy production.

---

**Company:**

Diamond Materials Inc.  
120 Centennial Avenue  
Piscataway, NJ 08854

**Title:**

Diamond-Hardfaced Nanocomposites for Extended Service Lives of Pump Bearings in Geothermal Wells

**Summary:**

Geothermal energy production is one of several proven technologies that promise to make significant contributions to US energy independence within the next 20 years. This project addresses the challenge of achieving increased lifetime for a geothermal pump bearing, thus increasing operating efficiency and reducing energy production cost.

---

**Company:**

NEI Corporation  
400 Apgar Drive  
Suite E  
Somerset, NJ 08873

**Title:**

High Performance Fluoroelastomer Nanocomposite Seals For Geothermal Submersible Pumps

**Summary:**

The proposed program to enhance the properties of elastomeric seals for use in geothermal energy production has the

potential to prevent failure of equipment and to allow the downhole equipment to run unattended for extended periods of time, greater than 5 to 10 years, without maintenance.

## TOPIC: HYDROGEN, FUEL CELLS AND INFRASTRUCTURE TECHNOLOGIES

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**Company:**

Directed Technologies, Inc.  
3601 Wilson Blvd.  
Suite 650  
Arlington, VA 22201

**Title:**

Aqueous Phase Base-Facilitated-Reforming (BFR) of Renewable Fuels

**Summary:**

This project investigates a novel low cost method of producing gaseous hydrogen from biomass or municipal solid waste (MSW). The process utilizes an aqueous phase Base-Facilitated-Reforming (BFR) reactor to produce pure hydrogen gas without additional purification and, in one configuration, sequester carbon in solid form to avoid release of greenhouse gases.

---

**Company:**

Faraday Technology, Inc.  
315 Huls Drive  
Clayton, OH 45315

**Title:**

Faradayic ElectroEtching of Stainless Steel Bipolar Plates

**Summary:**

This SBIR project will enable a high volume, low-cost, environmentally benign manufacturing process for bipolar plates for polymer electrolyte membrane fuel cells. This will facilitate the viability of fuel cells with an environmental and societal benefit in terms of reducing pollution and increasing manufacturing job opportunities in the United States.

---

**Company:**

Giner Electrochemical Systems, LLC  
89 Rumford Aveue  
Newton, MA 02466-1311

**Title:**

Anode Concepts for SO<sub>2</sub> Crossover Reduction in the HyS Electrolyzer

**Summary:**

Inexpensive, carbon-free hydrogen production is crucial to the strategy of efficiently powering our vehicles with this emissions-free fuel. This project will aid DOE's nuclear hydrogen development efforts by further improving Hybrid Sulfur electrolyzer design and, thereby, the efficiency and economic viability of this thermochemical cycle.

---

**Company:**

InnovaTek, Inc.  
350 Hills Street, Suite 104  
Richland, WA 99354-5511

**Title:**

Power Generation from an Integrated Biofuel Reformer and Solid Oxide Fuel Cell

**Summary:**

To help meet America's needs for improved energy security and reduced environmental impacts this project will develop technology for distributed energy generation from renewable sources using its proprietary steam reforming process with a solid oxide fuel cell for localized power generation from wood saw dust. Two public goals— environmental quality, especially the reduction of greenhouse gas emissions, and energy security—provide the policy foundation for a renewable-based energy system and the proposed technology.

## TOPIC: PETROLEUM INDUSTRY TECHNOLOGIES

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**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840

**Title:**

Non-thermal Plasma Cracking of Residual Distillate and Vacuum Gas Oil

**Summary:**

Heavy crude oil is becoming increasing important as supplies of light crude run out. However, processing of heavy crude is limited to large scale refineries. This project will allow cost effective refining of heavy crude in the Nation's small refineries, which are critical to meeting the Nation's liquid fuel supply.

---

**Company:**

Materials & Systems Research, Inc.  
5395 West 700 South  
Salt Lake City, UT 84104

**Title:**

Development of a Thermally and Electrically Self-Sustaining Hydrogen Generation System Directly Using Petcoke

**Summary:**

This project provides a technical and economic means for in-situ hydrogen production directly using a locally available opportunity fuel for petroleum refinery applications.

---

**Company:**

TDA Research, Inc.  
12345 W. 52nd Avenue Wheat Ridge, CO 80033-1916

**Title:**

Hydrogen Production for Refineries

**Summary:**

North America contains large reserves of heavy crude oil, but it takes considerable hydrogen gas to refine them. This project is developing a new technology so that refineries can produce hydrogen at a cost that is much lower than hydrogen from conventional technologies or purchased hydrogen.

**TOPIC: SOLAR ENERGY**

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**Company:**

Applied Nanotech, Inc.  
3006 Longhorn Blvd., #107  
Austin, TX 78758-7518

**Title:**

Non-Contact, Printable Metallic Inks for Silicon Solar Cells

**Summary:**

Electrical contacts are a critical part of photovoltaic technology and in particular represent a difficult and costly area for silicon solar cell production. The proposed research will exploit recent advances in nanotechnology to lower production costs for silicon solar cells by developing conductive inks that can be applied using non-contact printing techniques.

---

**Company:**

Crystal Systems, Inc.  
27 Congress Street  
Salem, MA 01970

**Title:**

Material Utilization and Waste Reduction through Kerf Recycling

**Summary:**

Currently, when silicon ingots are sliced into wafers for solar cells, nearly half of this expensive silicon ends up being wasted in the silicon swarf (or sawdust). A little used alternative technique for slicing silicon into wafers will allow this silicon sawdust to be recycled into new, high quality silicon ingots.

---

**Company:**

Luminit, LLC  
1850 205 Street  
Torrance, CA 90501-1821

**Title:**

Multifunctional UV Curable Sol-Gel Organic Hybrid Nanocomposite Encapsulation System

**Summary:**

To meet DOE SAI goals, a protective encapsulant is being developed to increase the efficiency and lifetime of solar cells/modules by providing an oxygen and moisture barrier with super hydrophobic and anti-reflection properties. By mass producing this encapsulant roll-to-roll, the cost of solar cells can be reduced by 50%.

**TOPIC: VEHICLE TECHNOLOGIES**

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**Company:**

MER Corporation (Materials and Electrochemical Research)  
7960 South Kolb Road  
Tucson, AZ 85706-9237

**Title:**

Lightweight Metal Foams with Tailorable Structure and Properties

**Summary:**

A low cost technology for metal foams with a uniform, consistent, and well-controlled cell structure and properties will be developed. New opportunities will be opened for production of lightweight energy absorbing vehicle components, which enable enhanced safety as well as weight and cost savings.

---

**Company:**

NEI Corporation  
400 Apgar Drive  
Suite E  
Somerset, NJ 08873

**Title:**

Nanotechnology-Based Self-Healing Coating System to Enable Extensive Use of Magnesium Alloys in Automotives

**Summary:**

The nanotechnology based self-healing coating system is designed to enable use of magnesium alloys in automobiles and hence increase their fuel efficiency.

---

**Company:**

Nanohmics, Inc.  
6201 E. Oltorf Street #400  
Austin, TX 78741

**Title:**

High Temperature, High Energy Density Film Capacitors

**Summary:**

This SBIR program will improve the performance of current capacitors by allowing them to operate at higher temperatures and higher voltages in smaller volumes current capacitors. Improvements in capacitors will, in turn, reduce the size of many military and commercial electronic systems.

**TOPIC: PRODUCTION OF BIOFUELS FROM BIOMASS**

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**Company:**

ACENT Laboratories, LLC  
3 Scott Lane  
Manorville, NY 11949

**Title:**

A Novel Low Cost, High Efficiency, Algal Biomass Harvest and Dewatering Technology for Biodiesel Production

**Summary:**

Biodiesel produced from microalgae has been identified as an attractive renewable fuel though the cost to produce it is not yet economically attractive. This project is developing a low cost, high efficiency algae harvesting and dewatering system to address one of the key process steps and hence facilitate the widespread utilization of this feedstock.

---

**Company:**

Altex Technologies Corporation  
244 Sobrante Way  
Sunnyvale, CA 94086

**Title:**

Biomass Blending Densification System (BBADS)

**Summary:**

Biofuels plant production is constrained by the high cost of moving agricultural residues from the farm to a central processing plant. The development of the proposed biomass densification and energy enhancement system will reduce feedstock costs, rendering biofuels plants more competitive with fossil fuels.

---

**Company:**

Renewable Algal Energy, LLC  
225 Rosehaven Court  
Kingsport, TN 37663-3427

**Title:**

Algal Biodiesel via Innovative Harvesting and Aquaculture Systems

**Summary:**

The production of biofuel from algae is one of the most promising new renewable fuel alternatives but research is needed to lower the cost of the process. New and improved methods for algae aquaculture and harvesting will be optimized and operated continuously in order to better estimate full-scale economics.

**TOPIC: NATURAL DISASTER REDUCTION THROUGH TECHNOLOGY**

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**STTR Project****Company:**

Arkansas Power Electronics International, Inc.  
535 W. Research Blvd.  
Suite 209  
Fayetteville, AR 72701

**Title:**

SiC-Based Solid-State Fault Current Control System for Reduction of Power Distribution Networks

**Summary:**

This project seeks to develop high-voltage, high-performance Solid-State Fault Current Controller (SSFCC) technology utilizing Silicon Carbide (SiC) super gate-turnoff thyristors (SGTOs). This technology will provide unprecedented fault protection capability greatly minimizing the recovery time and vulnerability of the network in the event of a large-scale natural disaster.

---

**Company:**

Electrocon International Inc.  
405 Little Lake Drive, Suite C  
Ann Arbor, MI 48103



**Title:**

Simulating the Smart Electric Power Grid of the 21st Century

**Summary:**

This project proposes the development of a simulation tool that will give electric power grid engineers the ability to design and evaluate the fast, wide-area control needed to avoid cascading outages and blackouts. This next generation program will integrate some of the disparate simulation programs of today with new control and communication models to analyze and design the smart grid of tomorrow.

**TOPIC: HIGH TEMPERATURE SUPERCONDUCTIVITY**

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**Company:**

Technology Applications, Incorporated  
5700 Flatiron Parkway  
Suite #5701A  
Boulder, CO 80301-5718

**Title:**

Flexible Cryostat for Superconductors

**Summary:**

This project will develop an improved cryostat system using plastic materials to contain high-temperature superconductor cable. These materials are used widely for underground storage vessels and piping. The improved cryostat has the potential to: increase lifetime in underground or underwater applications, improve thermal efficiency, and significantly reduce life-cycle costs.

**TOPIC: ADVANCED TECHNOLOGIES AND MATERIALS FOR FUSION ENERGY SYSTEMS**

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**Company:**

Plasma Processes, Inc.  
4914 Moores Mill Road  
Huntsville, AL 35811

**Title:**

Electrochemical Microalloying of Tungsten for Plasma Facing Component Applications

**Summary:**

Development of tungsten alloys with improved properties will allow the fabrication of robust fusion components; thus bringing fusion's promise of efficient electrical power generation, a step closer to being realized.

**Company:**

Ultramet  
12173 Montague Street  
Pacoima, CA 91331

**Title:**

Innovative Surfaces for Controlled Flow of Molten Lithium

**Summary:**

Fusion energy is an ideal alternative to fossil fuel energy, providing a greater quantity of environmentally friendly energy than wind, solar, and geothermal sources. Practical application of fusion requires the development of materials and structures that allow operation under the high temperature, high heat flux conditions necessary for cost-competitive energy generation.

**TOPIC: FUSION SCIENCE AND TECHNOLOGY**

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**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730

**Title:**

Power Supply for Ion Cyclotron Resonance Heating

**Summary:**

This project develop advanced RF transmitter capabilities for existing US fusion experiments which also will be available to international for future fusion experiments.

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Court  
Building 15, Suite 155  
San Diego, CA 92121

**Title:**

A Toolset for Kalman Filter Resistive-Wall-Mode Feedback Modeling Including Plasma Rotation

**Summary:**

The accurate, real-time identification and feedback control of unstable modes is essential for the success of advanced fusion reactors, and the development of these controls will speed the commercialization of efficient, clean fusion power. The proposed feedback tool will provide a key solution for an enhanced detection and feedback control of the instability.

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Court  
Building 15, Suite 155  
San Diego, CA 92121

**Title:**

Hyper-Velocity High-Density C60-Fullerene Plasma Jet for Disruption Mitigation

**Summary:**

Plasma jets have many important applications in magnetic fusion energy research. A reliable tool with real-time capability to solve the critical problem of disruption mitigation on future fusion reactors such as ITER will provide also a significant enhancement to other fusion and high energy density physics projects.

---

**Company:**

Nova Photonics, Inc.  
One Oak Place  
Princeton, NJ 08540

**Title:**

An In-Situ Calibration System for the MSW Diagnostic on ITER

**Summary:**

Experiments that study the potential for a safe and abundant energy source from magnetically confined fusion rely on the accurate measurements of magnetic fields. Next-generation devices pose new challenges for the calibration of existing techniques, and this project will prototype an in-situ calibration system that additionally enhances the measurement.

---

**Company:**

Physical Sciences Inc.  
20 New England Business Center  
Andover, MA 01810

**Title:**

Frequency Doubler for CO2 Laser ITER Diagnostics

**Summary:**

The ITER fusion reactor will lead the way for a future energy supply that is safe, does not generate greenhouse gases, and has an almost unlimited fuel. DOE plasma diagnostics are based on a CO2 laser and high efficiency color converting crystal for which this project will provide a one-hundred-fold improvement.

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## TOPIC: HIGH ENERGY DENSITY PHYSICS FOR INERTIAL FUSION ENERGY

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**Company:**

HyperV Technologies Corporation  
13935 Willard Road  
Chantilly, VA 20151

**Title:**

MiniRailguns for Fusion and HEDP

**Summary:**

This research project will demonstrate use of high velocity plasma jets to generate high density drivers suitable for imploding a plasma target to fusion relevant densities and temperatures. This technique could play a significant role in accelerating development of fusion power.

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## TOPIC: NUCLEAR PHYSICS ELECTRONICS DESIGN AND FABRICATION

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**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

Optical Detector with Integrated ADC for Digital Readout

**Summary:**

Advances in physics often track advances in detector technologies. This project provides a low cost, compact detector solution that facilitates the construction of large detector arrays used in fundamental physics experiments.

---

**Company:**

XIA, LLC  
31057 Genstar Road  
Hayward, CA 94544

**Title:**

High-Speed, Multi-Channel Detector Readout Electronics for Fast Radiation Detectors

**Summary:**

This project will develop high speed digital detector readout electronics that will help scientists to more precisely measure nuclear properties and thus better understand fundamental physics. It can also improve the performance of fast radiation detectors used in homeland security applications and other applications requiring precise timing.

---

## TOPIC: NUCLEAR PHYSICS ACCELERATOR TECHNOLOGY

**Company:**

Alameda Applied Sciences Corporation  
626 Whitney Street  
San Leandro, CA 94577-1116

**Title:**

Low Temperature Deposition and RF Analysis of Nb<sub>3</sub>Sn, an A-15 Superconductor for SRF

**Summary:**

The proposed effort will continue to explore whether superconducting Niobium (Nb) and Triniobium Tin (Nb<sub>3</sub>Sn) thin films produced by cathodic arc deposition are useful in Superconducting Radio Frequency (SRF) accelerator cavities. If Nb or Nb<sub>3</sub>Sn thin-films on Cu or Al eventually replace bulk Nb in SRF facilities, that could reduce the operating costs of future particle accelerators significantly due to the reduced cost of Cu (~\$3/lb) over Nb (~\$300/lb). This key innovation directly supports the most advanced, state-of-the-art, large-scale research and development facilities and national labs. This fundamental high energy physics research infrastructure will lead to additional world-class science, and is critical to maintaining U.S. leadership in science and engineering. In the past, research at such facilities has led to many of the most important discoveries in physics, with numerous spin-off technologies developing into entirely new industries.

---

**Company:**

Niowave, Inc.  
1012 N. Walnut Street  
Lansing, MI 48906

**Title:**

Development of SRF Multi-Spoke Cavities for Electron Linacs

**Summary:**

Future nuclear physics facilities will require high current electron linear accelerators. This project will develop superconducting multi-spoke cavities that offer several advantages over the elliptical structures used to date to accelerate electrons near the speed of light.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Designing a Coherent Electron Cooling System for High-Energy Hadron Colliders

**Summary:**

The Relativistic Heavy Ion Collider is colliding protons and gold ions to create conditions similar to what existed after the big bang. Novel software is being developed to assist DOE scientists in the design of accelerator systems to improve this premier nuclear physics facility.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Integrated Multiple Effects Software for Nuclear Physics Applications

**Summary:**

Nuclear physics accelerators are powered by microwaves which must travel in waveguide pipes between their room-temperature sources and the near-absolute-zero temperature of the accelerator structures. Design and analysis of this equipment requires parallel-processing software that integrates the very different aspects of thermal and microwave analysis.

**TOPIC: NUCLEAR PHYSICS INSTRUMENTATION,  
DETECTION SYSTEMS AND TECHNIQUES**

**Company:**

Integrated Photonics, Inc.  
132 Stryker Lane  
Hillsborough, NJ 08844

**Title:**

Neodymium-Containing Single Crystals for Neutrinoless Double Beta Decay Detection

**Summary:**

Neutrinos are the most prolific of all elementary particles so that knowledge of their mass is critically important to our understanding of the birth and evolution of the universe. Neutrino-less double-beta decay experiments have been identified by the Nuclear Science Advisory Committee of the NSF and DOE as a most important next step to complement the exciting space telescope data by determining the mass scale of neutrinos.

---

**Company:**

Nonlinear Ion Dynamics, LLC

13704 Saticoy Street  
Panorama City, CA 91402

**Title:**

Integrated Spin System for Production of Large Quantities of Stable Isotopes

**Summary:**

There is an enormous unmet demand of stable isotopes as a result of limitation of existing technologies and lack of domestic supply. A patented evolutionary technology is proposed for separating large quantities of stable isotopes in metallic and gaseous forms efficiently and economically through joint funding by government and private sources.

---

**STTR Project**

**Company:**

NOVA Scientific, Inc.  
10 Picker Road  
Sturbridge, MA 01566-1251

**Title:**

Compact and Efficient Cold and Thermal Neutron Collimators

**Summary:**

Science Laboratory of the University of California Berkeley will develop compact neutron collimators to improve neutron radiography. This will provide researchers with beam collimation improvements and more sensitive instrumentation with higher contrast capability for biological specimens and materials research. It will further US technology leadership in neutron sciences.

---

**Company:**

PHDs Co.  
777 Emory Valley Road  
Suite B  
Oak Ridge, TN 37830

**Title:**

High-Purity Germanium Crystals for Low Background Counting Arrays

**Summary:**

The Department of Energy Office of Nuclear Physics has a fundamental need for more sensitive, reliable, and cost effective instruments for large detector arrays for rare particle detection. The germanium crystals being developed will provide the basis for these detectors.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

Fast, Low Noise Photodetectors for Nuclear Physics

**Summary:**

The proposed project aims to investigate a new detector technology that will have far reaching implications in fundamental scientific studies as well as commercial applications. It will be useful in diverse fields such as physics research, homeland security, medical imaging, and astronomy.

---

**Company:**

STAR Cryoelectronics, LLC  
25-A Bisbee Court  
Santa Fe, NM 87508

**Title:**

Next-Generation Readout Electronics and Sensor Subsystem for nEDM

**Summary:**

This project will develop a next-generation readout electronics for ultra-sensitive superconducting sensors that are critical components of key experiments in nuclear physics, such as the search for the neutron electric dipole moment (nEDM), as well as for numerous commercial applications in biomedical imaging, geophysical exploration, non-destructive testing of materials, and basic research. This broad range of commercial applications offers many benefits to the general public in terms of improved health care, natural resource availability, and consumer product reliability.

---

**Company:**

Southwest Sciences, Inc.  
1570 Pacheco Street  
Suite E-11  
Santa Fe, NM 87505-3993

**Title:**

Magnetometer for the Neutron Electric Dipole Moment Experiment

**Summary:**

This project uses lasers and atomic physics to measure magnetic fields with high sensitivity. This capability will benefit DOE's fundamental research, but also has spin-off applications in medicine, mineral exploration, and homeland security.

## TOPIC: DEACTIVATION AND DECOMMISSIONING OF FACILITIES AND SITE REMEDIATION IN THE DOE COMPLEX

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**Company:**

NEI Corporation  
400 Apgar Drive  
Suite ESomerset, NJ 08873

**Title:**

A New Class of Nanocomposite Treatment Media for Efficient Mercury Remediation

**Summary:**

A nano-particle based technology is being developed to advance the state of the art in mercury remediation in contaminated DoE sites, thereby leading to cost savings and reducing the time for remediation.

## TOPIC: NUMERICAL SOFTWARE MAINTENANCE

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**Company:**

Harmonia, Inc.  
202 Kraft Drive  
Suite 1000  
Blacksburg, VA 24060-6747

**Title:**

Codebook: Accelerating Transformations in How the World Does Science Through Collaboration, Social Networking, and Semantic Analysis to Maintain and Support Computational Software

**Summary:**

This effort will accelerate and facilitate the production of scientific simulation data in an era of dramatically increased processing speeds. It will develop approaches to scale mathematical tools and libraries to be accessible at the new computing speeds.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe  
Avenue Suite A  
Boulder, CO 80303-1379

**Title:**

Sparse Algebraic Multigrid Preconditioners for High-Order Finite Element Systems

**Summary:**

The efficient usage of the DOE's massively parallel supercomputers maximizes the scientific insights that can be obtained over a given period of time. This efficiency is only possible with the continued improvements in the algorithms employed in today's complex computer models.

## TOPIC: SCIENTIFIC VISUALIZATION AND DATA UNDERSTANDING

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**Company:**

Kitware, Inc.  
28 Corporate Drive  
Clifton Park, NY 12065

**Title:**

Collaborative Visualization for Large-Scale Accelerator Electromagnetic Modeling

**Summary:**

The proposed work will create software tools that enable collaboration for viewing, interacting, and analyzing large data sets across geographically separated work-sites.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Analyzing and Visualizing Next Generation Climate Data

**Summary:**

The Mosaic grids adopted by atmospheric and ocean climate models are causing severe problems to post-processing and visualization applications. We propose to develop software that will allow climate prediction tools to correctly interpret data on these novel grids.

---

**Company:**

VisTrails, Inc.  
220 Chase Street  
Salt Lake City, UT 84113

**Title:**

Provenance-Enabling DOE Visualization Applications

**Summary:**

In this proposal, we will develop the framework to capture and manage all the steps that are taken by a user interacting with existing scientific visualization systems. The result will be a complete audit trail of the computational processes that are required to reproduce an image or discovery.

**TOPIC: HIGH PERFORMANCE NETWORKS**

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**Company:**

ANGEL Secure Networks, Inc.  
20 Godfrey Drive  
Orono, ME 04473-3610

**Title:**

Control and Data Plane Security of High Performance Networks

**Summary:**

High performance networks which are used to support major scientific experiments cannot be protected against cyber attacks by conventional security techniques. This approach is a software system which uses secure networking techniques to protect the network from cyber attack with no loss of network speed, performance, or availability.

**Company:**

Reservoir Labs, Inc.  
632 Broadway  
Suite 803  
New York, NY 10012-2614

**Title:**

High Performance Networks - Compilation and Optimization of Protocol Analyzers

**Summary:**

The volume and sophistication of cyber attacks on nationally critical infrastructure and defense systems is growing, and beginning to overwhelm our existing, reactive, low-coverage, cyber defenses. We propose to develop a new pro-active, high-coverage, defense technology based on new state-of-the-art compiler technologies.

**TOPIC: SCALABLE SYSTEM SOFTWARE FOR PETASCALE COMPUTER SYSTEMS**

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**Company:**

Accelogic, LLC  
609 Spinnaker  
Weston, FL 33326

**Title:**

Enhancing Sca/LAPACKrc with Extremely-Fast Least-Squares Solvers for Heterogeneous CPU/FPGA Supercomputers

**Summary:**

This project will meet DOE's and the nation's rapidly increasing supercomputing requirements through software acceleration technology that will reduce execution times from hours to seconds for the important class of "least-squares" problems. This will enable breakthrough improvements in real-time medical imaging, faster and more accurate methods to find oil, and more reliable electric power grids -- among many other applications.

**Company:**

Reservoir Labs, Inc.  
632 Broadway  
Suite 803  
New York, NY 10012-2614

**Title:**

Advanced Static and Dynamic Scheduling of HPC Applications on Petascale Computer Systems with GPU Accelerators

**Summary:**

Inexpensive Graphics Processing chips are a potentially very cost- and power-efficient engine for supercomputing that can accelerate advances for important problems that such as climate modeling, medical imaging, and energy exploration. What has been holding back GPGPUs until now has been programmability. This project will build programming tools to make GPGPU based supercomputing feasible.

**STTR Project:****Company:**

RNET Technologies, Inc.  
240 West Elmwood  
Suite 2010 Dayton, OH 45459

**Title:**

Creating Scalable Petascale File DriveSystems using Application-Aware Network Offloading

**Summary:**

Parallel file systems are required to access data on current and emerging supercomputers. Currently, these file systems have bottlenecks, which can severely affect many of the applications running on the expensive supercomputers. Hence, key components of a parallel file system must be optimized using advanced hardware and software solutions. In this STTR, we will accomplish these using a 10 Gigabit Ethernet "SmartNIC" that was developed on a prior DOE Phase II SBIR contract.

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**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Common Component Architecture for Electron Cloud Accelerator Simulations

**Summary:**

A significant amount of public resources have been invested in the development of software tools for computational accelerator physics. Component-based software development provides tools and practices for reusing existing algorithms, code, and applications, and it would make more efficient use of taxpayer's money.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Schema-Based Environment for Configuring, Analyzing and Documenting Integrated Fusion Simulations

**Summary:**

To ensure safe and efficient future power production, fusion science needs comprehensive fusion device modeling. This project will develop user-friendly tools to configure, analyze, visualize, and optimize integrated fusion simulations on the Leadership Computing Facilities.

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**TOPIC: REMOTE SENSING**

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**Company:**

Boston Applied Technologies, Incorporated  
6F Gill Street  
Woburn, MA 01801-1721

**Title:**

High-Throughput Ultra-Fast Tunable Filter for Multispectral Imaging

**Summary:**

A series of color pictures from specific target will improve detection and discrimination capability. This multi-color remote sensing is an enabling technology for security and military surveillance. The proposed filter will greatly improve the performance of this technology.

---

**Company:**

Boston Applied Technologies, Incorporated  
6F Gill Street  
Woburn, MA 01801-1721

**Title:**

A Field-Portable Polarization Imaging System for Remote Sensing

**Summary:**

A high performance polarization imaging system covering from visible wavelength to mid-infrared wavelength will find broad applications in both government and commercial markets. A novel electro-optic material will be used to develop the imaging system, which offers highest electro-optical constant in the world, broad spectral band, high speed, and very low hysteresis. It will carry a tremendous commercial potential for the next generation of polarization imaging instruments.

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**STTR Project:****Company:**

Optra, Inc.  
461 Boston Street  
Topsfield, MA 01983

**Title:**

H-PDLC Tunable Filter for Hyperspectral Imaging

**Summary:**

OPTRA, Inc. and Drexel University will partner to design, develop, and test a tunable wavelength filter using a new and novel liquid crystal based material. The filter will find application in monitoring systems for detecting Weapons of Mass Destruction (WMD).

---

**Company:**

Nova Photonics, Inc.  
One Oak Place  
Princeton, NJ 08540

**Title:**

Rapidly Tunable Optical Filter

**Summary:**

This project will develop a rapidly tunable wide field-of-view optical filter with flexible design parameters including

bandwidth and spectral range. The filter has numerous applications for remote sensing, environmental monitoring, and medical imaging.

---

**Company:**

Polaris Sensor Technologies, Inc.  
200 Westside Square  
Suite 320  
Huntsville, AL 35801

**Title:**

Polarimetry in Remote Sensing Applications to Enhance Signal-to-Noise Ratios, Man-made Object to Natural Background Material Contracts, and Provide Increased Image Stability in the Infrared Region

**Summary:**

This project is developing an innovative infrared imaging system that forms images of infrared scenes using polarized light. Elements of the image that are not visible using un-polarized light are made visible and information about orientation of surfaces and objects can be obtained thereby enhancing the detection of objects of interest.

---

**Company:**

Spectral Sciences, Inc.  
4 Fourth Avenue  
Burlington, MA 01803-3304

**Title:**

Full Spectral Signature Simulation Models for Chemical Releases

**Summary:**

Technologies enabling remote detection, identification and quantification of trace gases in the atmosphere provide critical information for uncovering activities associated with proliferation of weapons of mass destruction. Accurate chemical release signature and sensor performance models will be developed for this problem and, more generally, for environmental monitoring.

## TOPIC: RADIATION DETECTION

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**Company:**

CapeSym, Inc.  
6 Huron Drive  
Suite 1B  
Natick, MA 01760-1325

**Title:**

Detached Growth of Nuclear Detector Materials

**Summary:**

This program seeks to develop high quality, low-cost materials for radiation detectors used in homeland security, medical diagnostics, and nuclear industry.

---

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street  
Watertown, MA 02472-4699

**Title:**

New Approach for Lanthanide Halide Crystal Growth

**Summary:**

The proposed project will investigate a novel detector technology that will be very useful in nuclear non-proliferation monitoring. It will also be useful in other scientific studies (such as high energy physics and space research) as well as commercial applications (such as oil exploration, medical imaging, and non-destructive evaluation).

## TOPIC: SEISMIC DETECTION

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**Company:**

Eentec  
1100 Forest Ave  
Kirkwood, MO 63108

**Title:**

Seismic Detection Mini Seismometer

**Summary:**

A miniaturized high-resolution low cost seismometer will assist DOE tasks in providing detection systems for nuclear treaty monitoring under tight budgets, allow valuable scientific information for earthquake analysis, offshore oil undersea exploration, and structural engineering leading to better public safety, modifications of building codes, reinforcement of building, bridges, dams, etc.

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**Company:**

Michigan Aerospace Corporation  
1777 Highland Drive, Suite B  
Ann Arbor, MI 48108-2285



**Title:**

Real-Time Optical MEMS-Based Seismometer

**Summary:**

Monitoring of low-yield nuclear detonations is difficult with current seismic monitoring systems which are bulky, expensive, and difficult to deploy rapidly. The probability of detecting low-yield tests drops significantly if the explosion is below one kiloton. The proposed effort will develop a seismometer that is compact, ultra-sensitive and easily deployed for immediate monitoring of man-made seismic activities in critical locations. In addition, the seismometer will have applications in oil prospecting and mining activities, as well as space exploration, surveillance, and a variety of scientific studies, including volcano and earthquake monitoring research.

---

**Company:**

Silicon Audio, LLC  
2124 East 6th Street, Suite 105  
Austin, TX 78702

**Title:**

Micro-Seismometers via Advanced Meso-Scale Fabrication

**Summary:**

This project will develop a state-of-the-art miniature seismometer to address nuclear explosion monitoring needs of the DOE / NNSA. The technology combines optical elements with small mechanical components micro-fabricated on silicon.

---

**Company:**

Symphony Acoustics, Inc.  
103 Rio Rancho Blvd. NE  
Suite B-4  
Rio Rancho, NM 87124-1441

**Title:**

Laser Interferometric Miniature Seismometer

**Summary:**

We are developing a sensor that is a critical strategic tool in the fight against nuclear proliferation. This seismic sensor will be 1/50th the size of existing components, and will be easily deployable around the globe.

**TOPIC: HIGH ENERGY PHYSICS DATA ACQUISITION AND PROCESSING**

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**Company:**

Your File System Inc.  
255 W 94TH Street PHB  
New York, NY 10025

**Title:**

YFS, a High Performance Global File System That is Backward Compatible with AFS

**Summary:**

AFS is a distributed file system which is widely deployed throughout the High Energy Physics research community, however, it can no longer satisfy the demands placed upon it by growth. Unfortunately, migrating to alternate solutions has proven difficult or impossible. The goal of this project is to develop a new commercially available global file service. This will allow AFS users to achieve productivity improvements without costly and painful transitions between incompatible systems.

**TOPIC: ACCELERATOR TECHNOLOGY FOR THE INTERNATIONAL LINEAR COLLIDER**

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**Company:**

Advanced Energy Systems, Inc.  
27 Industrial Blvd. Unit E  
Medford, NY 11763-2286

**Title:**

Development of Reduced-Cost Helium Vessels for ILC Cavities

**Summary:**

The International Linear Collider (ILC) promises to open new frontiers in high energy physics. This can only happen if the machine is affordable to the worldwide community. This project will address one of the cost drivers for the 16,000 superconducting cavities and has the potential to save \$130M for the project.

---

**Company:**

DULY Research Inc.  
1912 MacArthur Street  
Rancho Palos Verdes, CA 90275-1111

**Title:**

Voltage Droop Compensation for High Power Marx Modulators

**Summary:**

The proposed voltage droop compensation scheme provides a simple, reliable and cost effective method to allow a high voltage Marx modulator to produce a flat-top voltage pulse as specified in the ILC project. Other accelerator facilities which need long pulse modulators will also benefit from the results of this project.

## TOPIC: ADVANCED CONCEPTS AND TECHNOLOGY FOR HIGH ENERGY ACCELERATORS

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**Company:**

AdValue Photonics Inc  
4585 S. Palo Verde Road  
Suite 405  
Tucson, AZ 85714

**Title:**

High Efficiency Fiber Laser for Advanced Accelerator

**Summary:**

Department of Energy needs single polarization mode-locked high power 2 micron fiber laser for advanced laser electron accelerator. This project is for the development of a new fiber laser by using innovative specialty fiber to meet Department of Energy's demand. This fiber laser can also be used for materials process, remote sensing, and bio-medical applications.

---

**Company:**

Alameda Applied Sciences Corporation  
626 Whitney Street  
San Leandro, CA 94577-1116

**Title:**

A Novel Gas Jet for Laser Wakefield Acceleration

**Summary:**

Laser wakefield accelerators could drastically reduce the size and cost of particle accelerators for medical, research, and industrial applications. The valve developed in this SBIR program is an enabling technology to allow accelerators to be built that can operate at higher repetition rates. Such valves may also be used to conduct research on traumatic brain injury, leading to better head protection gear for soldiers and civilians alike.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Road #102  
Solon, OH 44139

**Title:**

Development of a Diamond-Based Cylindrical Dielectric Loaded Accelerating Structure

**Summary:**

We plan to develop a manufacturing technology for artificial diamond tubes to be used in dielectric loaded accelerating structures. These diamond structures are expected to attain record high accelerating gradients. The results will be also applied to next-generation research accelerators and high power microwave systems as well as to medical equipment development.

---

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Court  
Building 15, Suite 155  
San Diego, CA 92121

**Title:**

Novel Linac Structure for Electron and Proton Accelerators

**Summary:**

This project will build and test a novel linac accelerating structure. The design could be a breakthrough as it significantly simplifies the structure and is thus cost effective.

---

**Company:**

FM Technologies, Inc.  
4431-H Brookfield Corporate Drive  
Chantilly, VA 20151-1691

**Title:**

Micro-Pulse Amplified Electron Injector

**Summary:**

This program will develop a radio-frequency accelerator that will provide a high power source suitable for many applications. Of particular importance are medical cancer therapy linacs, sterilization, and research injectors.

---

**STTR Project:**

**Company:**

Muons, Inc.  
552 N. Batavia Avenue  
Batavia, IL 60510

**Title:**

Pulsed Focusing Recirculating Linacs for Muon Acceleration

**Summary:**

Fast acceleration techniques are being developed for future Neutrino Factories and Muon Colliders using the high gradient

RF cavities that are being developed for the International Linear collider. A Muon Collider would provide a path back to the energy frontier for the US high energy physics program.

---

**Company:**

Particle Beam Lasers, Inc.  
18925 Dearborn Street  
Northridge, CA 91324-2807

**Title:**

Study of a Final Cooling Scheme for a Muon Collider Utilizing High-Field Solenoids

**Summary:**

This scheme for cooling muons should facilitate muon colliders, muon radiography for medical and homeland security applications, and condensed matter studies, nanotechnology, and other technologies. The advancement of superconductor technology should extend the field range of nuclear Magnetic Resonance Imaging magnets.

---

**Company:**

RadiaBeam Technologies, LLC  
13428 Beach Avenue  
Marina Del Rey, CA 90292-5624

**Title:**

The Micro Accelerator Platform: A New Particle Source for Industrial, Medical, and Research Applications

**Summary:**

High-energy X-rays are currently used in cancer therapy, non-destructive testing, and cargo inspection, however, the equipment used to produce them is large and expensive. This project will produce a device using nanotechnology and manufacturing methods from the microelectronics world that is 1000 times smaller and much less expensive than current systems. This transformative technology could bring new hope to cancer sufferers, a better way to inspect our industrial products, and a new tool in baggage and container security.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Service-Oriented Architecture for Next Generation, Large-Scale Accelerator Control Systems

**Summary:**

This project will develop a Service Oriented Architecture for next-generation, large-scale accelerator control systems to reduce the cost in developing and maintaining these control systems. The approach will produce more cost-effective and efficient scientific effort as more science of higher quality can be produced.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Avenue  
Suite A  
Boulder, CO 80303-1379

**Title:**

Inverse Cyclotrons for Intense Muon Beams

**Summary:**

Intense muon beams are sought for their role in future scientific programs at a number of national labs. We will develop a software suite to perform detailed end-to-end simulations of inverse cyclotron for use in generating such intense muon beams.

**TOPIC: RADIO FREQUENCY ACCELERATOR TECHNOLOGY FOR HIGH ENERGY ACCELERATORS AND COLLIDERS**

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**Company:**

Applied Pulsed Power, Inc.  
2025 Dryden Road  
P.O. Box 348  
Freeville, NY 13068

**Title:**

Optically Pumped High Power Solid State Switch

**Summary:**

New switching components are needed to improve electrical efficiency and reduce costs for electric power generation, transmission, and for applications such as radar. This project will develop a faster and lower cost switch than what is currently available.

---

**Company:**

Haimson Research Corporation  
3350 Scott Boulevard

Building 60  
Santa Clara, CA 95054-3104

**Title:**

Gradient Enhancement Research for Linear Accelerator Structures

**Summary:**

The enhancement of accelerating gradient would significantly advance radio-frequency linear accelerator technology and would have a positive impact on the design of future linear colliders and accelerators for commercial applications.

---

**Company:**

Omega-P, Inc.  
258 Bradley Street  
New Haven, CT 06510-1106

**Title:**

High-Power Microwave Switch Employing Electron Beam Triggering

**Summary:**

Progress in elementary particle high-energy physics depends on the evolution of technology to enable future machines to operate at higher energies than can be reached at present. The high-power microwave switches to be developed in this project are to allow tests of structures to sustain higher electric fields without breakdown, thus enabling operation at higher energy, and also opening up commercial applications with improved clinical accelerators, for example.

**TOPIC: HIGH-FIELD SUPERCONDUCTOR AND SUPERCONDUCTING MAGNET TECHNOLOGIES FOR HIGH ENERGY PARTICLE COLLIDERS**

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**Company:**

Muons, Inc.  
552 N. Batavia Avenue  
Batavia, IL 60510

**Title:**

Multi-Purpose Fiber Optic Sensors for HTS Magnets

**Summary:**

Optical fiber based sensors are being developed to monitor and protect HTS superconducting magnets used for particle accelerators, fusion reactors, and magnetic resonance imaging.

---

**Company:**

SCI Engineered Materials, Inc.  
2839 Charter Street  
Columbus, OH 43228

**Title:**

Homogenous BSCCO-2212 Round Wires for Very High Field Magnet

**Summary:**

The Department of Energy's National Laboratories require higher field magnets than currently available for high energy physics experimentation. This project addresses this need by improving the properties of ceramic high temperature superconductors by defining powder processing conditions for BSCCO-2212 powder that improves the superconducting properties of wires made with these materials.

---

**Company:**

Shear Form, Inc.  
207 Dellwood Road  
Bryan, TX 77801

**Title:**

Manufacture of Fine-Grained Niobium Bar

**Summary:**

Decreases in the starting grain size of bulk Nb for production of high-current fine-filament Nb<sub>3</sub>Sn superconductors will be achieved by an innovative and cost effective materials processing method. The result will be lower cost Nb<sub>3</sub>Sn superconductor wire with improved performance in high magnetic fields. With this improved Nb bar, it will be possible to manufacture higher field magnets for high energy physics applications such as particle accelerators.

---

**STTR Project:**

**Company:**

Supercon, Inc.  
830 Boston Turnpike  
Shrewsbury, MA 01545-3386

**Title:**

Insulation Materials and Methods for Bi2212 Magnets

**Summary:**

The goal of the program is to reduce the cost and risk associated with producing high temperature superconducting magnets for high energy physics, while also improving performance. Material development to advance the technology of high temperature, high field superconductors is necessary for maintaining US leadership in the fields of materials science, biomaterials, and high energy physics.

---

**Company:**

SupraMagnetics, Inc.  
214 Canal Street  
Plantsville, CT 06479

**Title:**

A New Multifilament Round Wire with Enhanced Bi2212 Texture for HEP High Field Magnet Applications

**Summary:**

A new economical Bi2212 superconductor with advanced performance will be developed for high field magnets utilized in high energy physics research, fusion machines, and MRI and NMR instruments for the general benefit of the public.

**TOPIC: HIGH ENERGY PHYSICS DETECTORS**

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**Company:**

Allcomp Incorporated  
209 Puente Ave  
City of Industry, CA 91746

**Title:**

Thermally Conductive, Carbon Foam Material for Constructing Silicon-Based Detector Structures

**Summary:**

Development of thermally conductive, exceptionally lightweight carbon foam will offer silicon based detector designers new low-cost opportunities for solving complex thermal and structural issues. This carbon foam is the current answer to high temperature heat exchangers for both military and commercial aircraft; replacing aluminum, titanium, or Inconel as core materials.

**Company:**

Coating Technology Solutions Inc.  
36 B Munroe Street  
Somerville, MA 02143-2009

**Title:**

High Performance Diamond Detectors

**Summary:**

Man-made diamond will be developed to improve discovery of fundamental laws of physics and to improve radiation survival rates for cancer patients.

**TOPIC: ADVANCED TECHNOLOGIES FOR NUCLEAR ENERGY**

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**Company:**

Analysis and Measurement Services Corporation  
9111 Cross Park Drive  
Building A  
Knoxville, TN 37923

**Title:**

Wireless Sensors for Predictive Maintenance of Rotating Equipment in DOE's Research Reactors

**Summary:**

This project will result in marketable technologies to optimize the operational safety and economy of Department of Energy's research reactors. This will be achieved through implementing advanced technologies for the maintenance of rotating equipment.

**STTR Project:****Company:**

Luna Innovations Incorporated  
1 Riverside Dr.  
Suite 400  
Roanoke, VA 24016

**Title:**

Low Draft Temperature Sensor Gen-IVCircle Simulation Test Planning and Hardware Development

**Summary:**

The goal of the program is to reduce the cost and risk associated with producing high temperature superconducting magnets for high energy physics, while also improving performance. Material development to advance the technology of high temperature, high field superconductors is necessary for maintaining US leadership in the fields of materials science, biomaterials, and high energy physics.

**TOPIC: SEARCH, DISCOVERY, AND COMMUNICATION OF SCIENTIFIC AND TECHNICAL KNOWLEDGE IN DISTRIBUTED SYSTEMS**

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**Company:**

Deep Web Technologies, LLC  
301 North Guadalupe  
Suite 201 Santa Fe, NM 87501

**Title:**

Enabling Comprehensive One-Stop Access to World-Wide Scientific and Technical Research

**Summary:**

There are thousands of sources of quality science information available that most scientists and researchers are not aware they exist. We will create a clearinghouse that will make these information sources discoverable and accessible leading to an acceleration of scientific discovery.

---

**Company:**

Edgewater Technology Associates, Inc.  
3528 Worthington Blvd., Suite 301  
Urbana, MD 21704

**Title:**

Search Enhancement with Adaptive Thesaurus and Ontology Resources

**Summary:**

This research project aims to improve the methods for creating, organizing, maintaining and using scientific and technical reference thesauri and semantic knowledge bases for the purpose of improving the quality and usefulness of search results from scientific and technical databases.

---

**Company:**

Information International Associates, Inc.  
1055 Commerce Park Drive, Suite 110  
Oak Ridge, TN 37830-8028

**Title:**

Interactive Peer-to-Peer Scientific Communication in the Digital Library Environment

**Summary:**

There is a need for DOE scientists conducting similar research to be able to identify each other and to quickly collaborate on ideas. This research explores the concept of using Web 2.0 or social networking technologies in an electronic scientific library environment to facilitate these activities.

## TOPIC: POWER GENERATION TECHNOLOGIES FOR COAL-BASED POWER PLANTS

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**Company:**

Celltech Power, LLC  
131 Flanders Road  
Westborough, MA 01581-1031

**Title:**

Liquid Tin Anode Direct Coal Fuel Cell

**Summary:**

The development of clean, efficient, coal power generation technology is fundamental to USA energy security. The Liquid Tin Anode Fuel Cell can provide low cost, high efficiency power from coal while enabling capture of up to 90% of the CO<sub>2</sub> produced. This project will address key risks to the commercialization of this technology by thoroughly testing the core fuel cell components.

---

**Company:**

Precision Combustion, Inc.  
410 Sackett Point Road  
North Haven, CT 06473

**Title:**

Compact and Streamlined Oxy-Syngas Reheat Combustor

**Summary:**

In support of national goals for clean coal utilization and addressing global climate change, development of combustors for electric power generation is required. The Phase II effort will experimentally demonstrate the performance of a novel reheat combustor with success leading to commercialization of power generation capability with efficient carbon sequestration.

---

**Company:**

R&D Dynamics Corporation  
15 Barber Pond Road  
Bloomfield, CT 06002

**Title:**

Foil Gas Bearing Supported High Temperature Cathode Recycle Blower

**Summary:**

Large multi-megawatt size Solid Oxide Fuel Cell based Integrated Gasification Fuel Cell power plants are being developed and planned for the near future. This project will develop a reliable, oil-free and affordable cathode and anode recycle blower, capable of 850 oC, which will improve the energy efficiency of multi-megawatt size fuel cell systems and thus will help our nation use its most abundant fossil fuel resource in an environmentally friendly manner while create green jobs.

## TOPIC: INNOVATIONS TO REDUCE ENVIRONMENTAL IMPACT AND INCREASE EFFICIENCY IN COAL POWER PLANTS

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**Company:**

CyboSoft, General Cybernation Group, Inc.  
2868 Prospect Park Drive  
Suite 300  
Rancho Cordova, CA 95670-6065

**Title:**

Intelligent Actuation Control Using Model-Free Adaptive Control Technology

**Summary:**

This proposal can result in an intelligent actuation control solution that is critical to controlling future energy plants that can deliver maximum-energy-efficiency, near-zero-emissions, fuel flexibility, and multi-products. This solution can help the U.S. strengthen its energy independence, security, and movement towards a cleaner environment.

---

**Company:**

Trimeric Corporation  
P.O. Box 826  
Buda, TX 78610

**Title:**

Selenium Speciation and Control Technologies in Sulfate-Rich Wet FGD Systems

**Summary:**

This research will develop new technology to reduce selenium water discharges from coal-fired electric power plants and to reduce selenium environmental releases from power plant byproducts. The public will benefit from reduced exposure to selenium from the use of an abundant domestic energy source.

**TOPIC: HIGH PERFORMANCE MATERIALS FOR LONG  
TERM ENERGY APPLICATIONS**

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**Company:**

Titanova, Inc.  
12724 Pennridge Drive  
Bridgeton, MO 63304

**Title:**

Novel Diode Laser Cladding of High Temperature Alloys for Used in Ultrasupercritical Coal-Fired Boilers

**Summary:**

This project will develop and certify direct diode laser systems and processes for cladding future ultrasupercritical and existing coal-fired boiler fireside components. It will result significant improvements in clad material properties and fabrication costs, resulting in an increase in boiler efficiencies, thus reducing utilities pollution and carbon dioxide emissions.

**TOPIC: ENHANCED OIL RECOVERY, OIL SHALE, OIL  
AND NATURAL GAS TECHNOLOGIES**

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**Company:**

Combustion Resources  
1453 West 820 North  
Provo, UT 84601-1343

**Title:**

Demonstration of Advanced Technology for Surface Processing of Oil Shale

**Summary:**

Clean, economic development of vast western oil shale reserves can supplement unreliable, costly imported petroleum and improve national security. Proposed work will demonstrate, at pilot plant scale, a patent-pending oil shale process offering near zero carbon dioxide emissions and low water usage, while utilizing inexpensive hydrogen to upgrade shale oil. Work includes plans for process scale-up and commercial application.

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