

# DOE SBIR & STTR GRANT APPLICATION AWARDS FISCAL YEAR 2010 PHASE I

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- Accelerator Technology For The International Linear Collider
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- Radio Frequency Accelerator Technology For High Energy Accelerators And Colliders
- Advanced Technologies And Materials For Fusion Energy Systems
- Fusion Science And Technology
- High Energy Density Laboratory Plasma (Hedlp)

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## TOPIC: HYDROGEN, FUEL CELLS, AND INFRASTRUCTURE TECHNOLOGIES PROGRAM

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**Company:**

Creare Incorporated  
16 Great Hollow Road  
P.O. Box 71  
Hanover, NH 03755-3116

**Title:**

Low-Cost, Durable Water Vapor Transport Exchanger

**Summary:**

This project will develop critical technology that will enable vehicle propulsion and stationary power generation using low-cost, durable fuel cell power systems. This water management technology will enable reliable fuel cell operation by preventing dryout of the fuel cell and providing water needed for fuel processing.

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**Company:**

Engineering, Procurement & Construction, LLC  
12211 W Alameda Parkway  
Suite #105  
Lakewood, CO 80228-2825

**Title:**

Hydrogen Fueling Station Cost Reduction; Study of a Cryogenic Liquid Phase Pump as an Alternative to Gas Compression

**Summary:**

This project will develop a database of hydrogen refueling costs, and create a methodology to evaluate technology lifecycle cost reduction. Hydrogen compression costs which currently account for a substantial portion for the total costs of hydrogen fueling infrastructure must be reduced for low cost dispensing to become commercially viable.

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**Company:**

Hawaii Hydrogen Carriers, LLC  
531 Cooke Street  
Honolulu, HI 96813-5235

**Title:**

Low Cost Metal Hydride Hydrogen Storage System for Forklift Applications

**Summary:**

This project will develop a low cost metal hydride hydrogen storage solution for fork lift trucks thus to enable widespread consumer uptake of hydrogen fuel cell powered fork lift trucks due to the increased overall value proposition and inherent safety of these low pressure systems.

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**Company:**

Proton Energy Systems  
10 Technology Drive  
Wallingford, CT 06492-1955

**Title:**

Low Cost Large Scale PEM Electrolysis for Renewable Energy Storage

**Summary:**

This company manufactures hydrogen generation systems which can be integrated with renewable energy sources to generate hydrogen fuel while producing minimal carbon footprint. This project aims to reduce the cost of this technology through development of improved membrane technology designed to reduce raw material cost and improve electrical efficiency.

**TOPIC: ADVANCED SOLAR TECHNOLOGY**

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**Company:**

Alers Photovoltaics  
N239 King Road. Room 178  
Advanced Studies Laboratory  
Moffet Field, CA 94035-0001

**Title:**

Cell Reliability in Solar Modules Measured with an Active Shading Screen

**Summary:**

This project will develop a new apparatus is developed that can measure the performance parameters of individual components in a solar panel without taking apart the panel. These parameters can now be tracked to improve both manufacturing and reliability of solar panels that will provide clean energy.

**Company:**

ColnaTec, LLC  
1230 E. Baseline Road  
Suite 103-315  
Mesa, AZ 85204-6706

**Title:**

Self Cleaning Process Control Sensor for Thin Film Solar Cell Manufacturing

**Summary:**

This project will develop a state-of-the-art processing sensor for the manufacture of thin film solar cells. This new sensor will eliminate many of the defects in existing technology and offer significant cost savings in solar cell production.

**Company:**

Ridgetop Group, Inc.  
6595 N Oracle Rd  
Tucson, AZ 85704-5645

**Title:**

Uptime Improvements for Photovoltaic Power Inverters

**Summary:**

This project will design a modular, condition monitoring subsystem with accurate reliability prediction and capability for solar power systems, which improves state-of-the-art degradation diagnostics and reliability prediction methods for field-deployed inverters.

**Company:**

Spire Corporation  
One Patriots Park  
Bedford, MA 01730-2396

**Title:**

Next-Generation, LED-based, Adjustable Spectrum, Pulsed Solar Simulator

**Summary:**

This project will develop a next-generation solar simulator based on light-emitting-diode (LED) technology. The simulator is used to rate the PV module for power output based on international standards at the end of the manufacturing process. Compared to current simulators, this new system will provide higher accuracy, increased reliability, greater versatility, as well as reduced power consumption, maintenance and overall cost of ownership.

**Company:**

Spire Corporation  
One Patriots Park  
Bedford, MA 01730-2396

**Title:**

Photoluminescence for Solar Cell Crack Detection

**Summary:**

Microcracks in solar cells will be detected using a noncontact, photoluminescent technique that will decrease the cost of solar energy, and improve solar module lifetimes.

**TOPIC: ADVANCED THERMOELECTRIC TECHNOLOGIES**

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**STTR Project**

**Company:**

NanoSonic, Inc.  
1485 South Main Street  
Blacksburg, VA 24060-5556

**Title:**

Bulk Thermoelectric Materials

**Summary:**

Thermoelectric (TE) materials allow low-grade heat (waste heat) to be converted into useful electrical energy. This project will result in the technical advancement and commercialization of a low-cost nanostructured composite thermoelectric device.

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**Company:**

Plasma Controls, LLC  
1180 La Eda Lane  
Fort Collins, CO 80526-4415

**Title:**

A Thin-film Thermoelectric Generator will be Developed Using a Novel Manufacturing Approach

**Summary:**

This project will investigate a novel manufacturing approach to fabricate high-efficiency thermoelectric generator modules. These modules can be used to generate electricity from the waste heat of engines and help lower fuel consumption.

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**Company:**

TAM Ceramics LLC  
4511 Hyde Park Blvd.  
Niagara Falls, NY 14305-1215

**Title:**

High Temperature Integrated Thermoelectric System and Materials

**Summary:**

This project will research and develop thermoelectric materials and an integrated system to recover waste heat and to convert it into useful electrical energy. It has economical and environmental benefits to industries such as the automotive, glass, power plant, and other industrial processes where high temperature heat is generated.

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**Company:**

Thermacore, Inc.  
780 Eden Road  
Lancaster, PA 17601-4794

**Title:**

Vehicle Waste Heat Recovery System

**Summary:**

Heat sent to the environment as exhaust represents an untapped resource in our nation's energy portfolio. This project will enable energy to be captured from this waste stream and turned into useful electrical energy without moving parts with the added benefit of improving overall fuel efficiency and reducing greenhouse gas emissions.

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**Company:**

ThermoDynamic Films  
7224 General Kearny Ct. NE  
Albuquerque, NM 87109-6304

**Title:**

Post-Peltier Thermoelectric Cooling

**Summary:**

This project will develop post-Peltier thermoelectric coolers that have the potential to be less expensive and more efficient than conventional thermoelectric devices. The thin-film format of this new technology permits low-cost manufacturing techniques and engenders countless new applications that would be impossible with current technologies.

**TOPIC: GEOTHERMAL ENERGY TECHNOLOGY DEVELOPMENT**

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**Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Ave.  
Lancaster, PA 17601-5606

**Title:**

Vortex Enhanced Direct Contact Heat Exchanger for Geothermal Cooling

**Summary:**

This program will develop a vortex based heat exchanger for geothermal based HVAC applications by taking advantage of the earth's constant and low temperature, to cool a building. The device mixes the incoming cold water with the air to be cooled and separates them after the heat exchange has occurred.

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

HiFunda, LLC  
2150 South 1300 East  
Suite 500  
Salt Lake City, UT 84106-4375

**Title:**

High-Reliability Cements for Enhanced Geothermal Systems

**Summary:**

This project will develop a new hybrid cement system that can be easily produced and installed on site during Enhanced Geothermal Systems (EGS) well construction. The proposed project can help to meet one of the key technical needs for the commercial viability of EGS, and can result in the widespread utilization of geothermal energy, which can result in lowering of greenhouse gases while meeting our growing energy needs.

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**Company:**

NanoSonic, Inc.  
1485 South Main Street  
Blacksburg, VA 24060-5556

**Title:**

High Performance Hybrid Polyorganosiloxane Cements for Enhanced Geothermal Systems

**Summary:**

This project will develop a hybrid copolymer cement technology that will significantly enhance the efficiency and reduce maintenance requirements for Enhanced Geothermal Systems (EGS) well components. Marketability will be ensured by dynamic applicability to multiple commercial and consumer markets, combined with low materials and application costs.

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**Company:**

United Silicon Carbide, Inc.  
100 Jersey Avenue, Bldg. A, Suite 208  
New Brunswick, NJ 08901-3268

**Title:**

High Temperature Smart Sensor for Downhole Logging and Monitoring

**Summary:**

This project will develop circuits and subsystems that will enable more sophisticated natural gas and oil exploration. In addition, the underlying technologies will enable more efficient hybrid electric vehicles and electrical distribution systems.

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**Company:**

Weston Geophysical Corp.  
181 Bedford St., Suite 1  
Lexington, MA 02420-4430

**Title:**

Improved Time-Dependent Seismic Monitoring Systems for Enhanced Geothermal Reservoir Characterization

**Summary:**

This project will result in images of subsurface seismic velocity structure and maps of micro-earthquake activity, which would provide direct evidence of fracture locations and parameter changes related to fluid flow as they evolve over time in geothermal reservoirs.

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## TOPIC: PRODUCTION OF BIOFUELS FROM CELLULOSIC BIOMASS

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

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

**Title:**

Energy Efficient Process for Solvent Extraction of Oil from Microalgae using Green Solvents

**Summary:**

Algae oil is an attractive source of renewable energy. This project will reduce the cost and develop a safer process for recovery of algae oil.

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**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Drying Enhancement Through PEF Processing

**Summary:**

This project will assess and develop a method of pre-treating biomass prior to drying it as it is refined into biofuel. A novel use of high voltage called Pulsed Electric Field processing will be adapted to improve the efficiency and lower the cost of biomass drying processes.

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**Company:**

Energy Derived LLC  
P.O. Box 1130  
Queen Creek, AZ 85142-1824

**Title:**

Drying and Moisture Management of Microalgae Biomass

**Summary:**

This project will develop multiple technologies for the development of algae biomass as a potential solution to America's dependence on foreign based petroleum products. This research will address the drying and moisture management of

algae biomass by utilizing waste heat energy as the primary source of energy for the process.

**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840-4023

**Title:**

Home Based Municipal Solid Waste Processor for Biofuel Synthesis Based on Non Thermal Plasma

**Summary:**

This project will produce methanol and ethanol from municipal solid waste, which is a domestic renewable energy source. This technology is anticipated to provide another tool for the U.S. to battle the rising political and economic costs of foreign oil by switching to transportation fuel produced from domestic sources.

**Company:**

Phycal, LLC  
51 Alpha Park  
Highland Heights, OH 44143-2202

**Title:**

Solid Phase Lipid Extraction of Algal Oil

**Summary:**

This project will develop and demonstrate an economical method for the extraction of oil from algae for biofuels using oil absorbing glass or zerogel. This will help stimulate successful implementation of economical algal oil production for the burgeoning algae biofuels industry promoting U.S. energy security, safeguarding the environment, and stimulating job creation in the biofuels market.

**Company:**

Synaptic Research, LLC  
1448 South Rolling Road  
Baltimore, MD 21227-3898

**Title:**

Enhanced Process for the Extraction and Purification of Oils from Microalgae Using CO2 as a Solute

**Summary:**

This project will utilize high-pressure CO2 to release the oils from the cells and promote the efficient separation of wet algal biomass into oils, water, and biomass. The projections for algal biofuel cost reduction due to this technology are significant.

**TOPIC: ADVANCED FOR SUBCOMPONENTS CRITICAL TO ELECTRIC DRIVE  
VEHICLE POWER INVERTERS AND MOTORS**

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**STTR Project**

**Company:**

Advanced Thermal Technologies, LLC  
91 South Street  
Upton, MA 01568-1445

**Title:**

Low Thermal Resistance Integrated Package and Heat Sink for HEV IGBT Modules

**Summary:**

This company's packaging and heat sink technology will support increased heat dissipation that will lead to improved efficiency and reliability for HEV power conversion modules as well as a range of other industrial and commercial power electronics systems. This technology will support enabling packaging solution for more efficient next generation semiconductor materials that will provide benefits to society in the form of more efficient products that consume less energy and contribute to improved environmental quality by reducing greenhouse gas emissions.

**Company:**

Applied Nanotech, Inc.  
3006 Longhorn Blvd. Suite 107  
Austin, TX 78758-7631

**Title:**

Nanomaterials for High Performance Thermal Packaging

**Summary:**

The novel thermal management substrates will allow high power electronics, such as those in hybrid vehicle propulsion systems, to operate more efficiently and with less cumbersome, lower cost cooling systems. This company's thermal management solution provides increased heat rejection compared to currently available materials.

**Company:**

MER Corporation (Materials and Electrochemical Research)  
7960 South Kolb Road  
Tucson, AZ 85756-9237

**Title:**

A Low Cost Continuous Process to Produce Magnet Alloys

**Summary:**

Reducing the cost of a critical component leading to expanded use of electrical vehicles, reduces pollution and the necessity to import oil which benefits the whole Nation. Neodymiumiron magnets have many uses in addition to electrical vehicles such as in mining for separations and all processes utilizing a magnetic field including wind generation of electricity.

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**Company:**

Strategic Polymer Sciences, Inc.  
200 Innovation Blvd, Suite 237  
State College, PA 16803-6602

**Title:**

Advanced Film for Capacitors for Power Inverters in Electric Drive Vehicles

**Summary:**

This company will develop high performance DC bus film capacitors with high energy density, low cost, and high reliability. The advanced capacitors can be used in electric drive vehicles, medical defibrillators, and military pulsed power weapon systems.

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**Company:**

Technology Assessment and Transfer, Inc.  
133 Defense Hwy 212  
Annapolis, MD 21401-8907

**Title:**

CSL-Fabricated Advanced Microchannel Coolers

**Summary:**

This project is using a unique process to make cooling modules for electronics in next-generation hybrid electric vehicles. These cooling modules will increase vehicle efficiency, reduce greenhouse gas emissions, and reduce the overall cost of the vehicle.

## TOPIC: WIND ENERGY TECHNOLOGY DEVELOPMENT

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**STTR Project**

**Company:**

Extreme Diagnostics, Inc.  
6960 Firerock Court  
Boulder, CO 80301-3814

**Title:**

Ultra Low-Power and Embeddable Blade-Condition Monitor

**Summary:**

Wind turbine blade failure has severe consequences—lengthy and confidence-destroying down times, as well as collateral damage. EASE monitors and assesses the condition of wind turbine blades, and provides early damage warning.

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**Company:**

Fulcrum Composites Inc.  
1407 East Grove Street  
Midland, MI 48640-5284

**Title:**

Development of High Strength, High Fatigue Wind Blade Spars

**Summary:**

This project will develop and demonstrate a new method to produce the spar for wind turbine blades. This will improve long term performance and reliability and contribute to the safe rapid expansion of the wind energy industry in the US.

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**Company:**

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

**Title:**

WeatherVane - A Predictive Analytics Engine for Global Monitoring of Wind Turbines

**Summary:**

Michigan Aerospace Corporation, John Deere Wind Energy and NREL propose the development of the Predictive Analytics system that can be deployed for any model of Wind Turbine to reduce down-time, minimize costs associated with repair and increase the output of individual turbines and Wind Farms delivering power to the U.S. power grid.

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**Company:**

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

**Title:**

Millimeter Wave Inspection Tool for Wind Turbine Components

**Summary:**

The Department of Energy is seeking an improved method to inspect wind turbine component for defects during and after manufacturing. This research addresses the problem by developing a novel inspection tool that rapidly scans the turbine blades, provides their images, and finds defects that lie beneath the surface.

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**Company:**

Skyacht Aircraft Inc.  
DBA Heavy Lift Systems  
110 Pulpit Hill Road  
Amherst, MA 01002-4006

**Title:**

Tethered Aerostat Crane for Wind Turbine Construction and Maintenance

**Summary:**

The Tethered Aerostat Crane (TAC) is a brand new type of crane specifically designed for use by the wind energy industry. The TAC will break the economic and logistic logjams created by the conventional ground-based cranes that currently hinder the economic viability of wind power.

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

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

CFX Battery, Inc  
1300 W Optical Drive Suite 300  
Azusa, CA 91702-3251

**Title:**

High Energy Density Battery with Multi-Electron Redox Couple

**Summary:**

This project will develop a fluoride ion rechargeable battery technology that has significantly higher energy storage capability than the current lithium-ion systems and, since it's a lithium free technology, the safety will be considerably improved compared to the existing batteries. This technology will reduce dependence on foreign oil, diminish environmental pollutions, and revolutionize the way automobiles are powered.

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**Company:**

Chemat Technology Inc.  
9036 Winnetka Avenue  
Northridge, CA 91324-3235

**Title:**

The Sol-Gel Derived Novel High Capacity Cathode Materials for Li-ion Batteries

**Summary:**

This project will develop novel high capacity cathode materials for Li-ion batteries to achieve high power and high energy densities, due to rigorous weight and volume constraints of HEV and PHEV. The new cathode materials will be based on the multi-electron redox mechanism and fabricated by the sol-gel nano process. The chemical precursors and processing conditions will be determined and the special functional nano-coatings will be applied to the nanomaterials for Li-ion cathodes. The resulted materials are expected to have high energy, low cost, green and long cycle life.

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**Company:**

Leyden Energy  
46840 Lakeview Blvd  
Fremont, CA 94538-6543

**Title:**

New Electrolytes for Lithium-ion Cells

**Summary:**

This project will develop a new electrolyte that will significantly improve the performance and safety of conventional lithium-ion batteries. These improved batteries are required for applications with severe operating conditions, including automotive: hybrid, plug-in hybrid and electric vehicles.

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**Company:**

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

**Title:**

Inexpensive Carbon Matrix for High Performance Lithium Sulfur Batteries

**Summary:**

This project will develop new electrode materials for lithium-sulfur batteries resulting in capacities at least twice that of state of the art lithium-ion batteries. Patented carbon technology will be use to make conductive containment for the sulfur active materials.

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

Versatile Dynamics, Inc.  
4 Nicholas Lane  
Sandwich, MA 02563-1874

**Title:**

Non-flammable and High Voltage Electrolytes and No Carbonates



**Summary:**

This project addresses the marriage of high voltage stability, non-flammable electrolytes, under development with lithium battery manufacturing capabilities. This project will result in a practical, rechargeable lithium battery with voltage capabilities that significantly exceed state of the art batteries.

**TOPIC: TRANSITIONAL TECHNOLOGY FOR SOLID STATE LIGHTING**

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**Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Ave.  
Lancaster, PA 17601-5606

**Title:**

Dielectric Printed Circuit Board Planar Thermosyphon

**Summary:**

A core technology is proposed for improved thermal management of LEDs, currently a critical obstacle in the development of the solid state lighting industry. An innovative approach to circuit board design allows it to also function as a highly conductive heat spreader, significantly improving the thermal management over current methods.

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**Company:**

Luminus Devices Incorporated  
1100 Technology Park Drive  
Billerica, MA 01821-4111

**Title:**

Smart and Efficient Driver for Big-Chip Photonic Lattice LEDs

**Summary:**

This project will develop low-cost, efficient, smart-grid/smart-metering compatible, electrical drivers for these LEDs. Such drivers will enable more companies to exploit the advantages of the big-chip LED approach and accelerate the move to solid-state lighting.

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**Company:**

Orbital Technologies Corporation  
1212 Fourier Drive  
Madison, WI 53717-1961

**Title:**

Off-Grid Solid-State Agricultural Lighting

**Summary:**

This project investigates the feasibility of using alternative energy sources such as solar photovoltaic to power solid-state lighting systems for ornamental crop production as a means of reducing agricultural energy demands from the general power grid, improving crop productivity and quality, and increasing flexibility in locating commercial growing operations.

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

Sinmat Inc.  
2153 SE Hawthorne Road, Ste 124 (Box 2)  
Gainesville, FL 32641-7553

**Title:**

Low Cost, Scalable Manufacturing of Microlens Engineered Substrates (MLES) for Enhanced Light Extraction in OLED Devices

**Summary:**

Lighting consumes >20% of the total electricity generated in the U.S. and nearly 30% of electricity used in commercial and residential buildings. This project will lead to three fold increase in the efficiency of organic light emitting diodes, resulting in substantial energy saving and environmental benefits to the nation.

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**Company:**

Universal Display Corporation  
375 Phillips Blvd.  
Ewing, NJ 08618-1428

**Title:**

Thermal Management of Phosphorescent Organic Light Emitting Devices

**Summary:**

This project will increase the lifetime of highly efficient solid state lighting based on phosphorescent organic-light-emitting devices, and thereby enable replacement of inefficient incandescent bulbs, which consume over 8% of the electricity produced in the United States.

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**Company:**

Universal Display Corporation  
375 Phillips Blvd.  
Ewing, NJ 08618-1428

**Title:**

Novel Optical Enhancement for Thin Phosphorescent OLED Lighting Panels

**Summary:**

This project will enable the development of high-efficiency, environment-friendly, solidstate, white-lighting sources.

## **TOPIC: ENERGY EFFICIENT MEMBRANES FOR INDUSTRIAL APPLICATIONS**

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### **Company:**

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

### **Title:**

Novel Membranes for Olefin/Paraffin Separation

### **Summary:**

This project will result in a process that will reduce the cost of ethylene and propylene, two widely used chemicals in the plastics industry, by 27% with an additional energy cost savings of 22% or 26 trillion BTU/yr.

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### **Company:**

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

### **Title:**

Improved Hydrogen Purification

### **Summary:**

This project will develop high performance and robust membranes for the purification of hydrogen in petrochemical and oil refining industries. The results of this project will facilitate the U.S. movement to the hydrogen economy and have quantifiable contributions to energy independence and carbon sequestration.

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### **STTR Project**

#### **Company:**

Helios-NRG, LLC  
12 Yardley Lane  
East Amherst, NY 14051-1683

#### **Title:**

Advanced Membrane Technology for Helium Recover

#### **Summary:**

This project will develop a step change membrane technology which will enable the recovery of helium from vast, but marginal sources which are uneconomic today. This will revive declining U.S. production, maintain U.S. global leadership and ensure reliable supply of this valuable resource for decades to come.

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### **STTR Project**

#### **Company:**

Mainstream Engineering Corporation  
200 Yellow Place  
Rockledge, FL 32955-5327

#### **Title:**

Nickel-Based Amorphous Metal Membranes for Water Gas Shift Reactors

#### **Summary:**

A clean, sustainable future hydrogen economy can only emerge if cost-effective technologies for high-volume hydrogen production are developed. This company has developed a critical, enabling patentable technology, which moves the U.S. significantly closer to the goal. This project will demonstrate a new cost effective and practical approach to hydrogen production that more efficiently extracts hydrogen from natural gas, coal, and biomass resources. This effort represents a major step towards America's energy independence.

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### **Company:**

Materials & Systems Research, Inc.  
5395 West 700 South  
Salt Lake City, UT 84104-4403

### **Title:**

Innovative Fabrication of High Temperature CO<sub>2</sub> Selective Membrane for Hydrogen Generation via Membrane-Enhanced Water-Gas Shift Reaction

### **Summary:**

This project will develop a thin, high temperature CO<sub>2</sub> separation membrane with engineered microstructure for efficient hydrogen production from fossil fuel.

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### **STTR Project**

#### **Company:**

T3 Scientific, LLC  
1839 Noble Road  
Arden Hills, MN 55112-7834

#### **Title:**

High Surface Area-to-Volume Ultrathin Dense Membrane for Hydrogen Separation

#### **Summary:**

This proposal is to develop a novel high surface area ultrathin dense silica membrane for the production of high-purity hydrogen from coal to support domestic and global green economy with near-zero emission.

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

UES Inc.  
4401 Dayton-Xenia Road  
Dayton, OH 45432-1894

**Title:**

Membrane Materials with Improved Properties

**Summary:**

This project will develop a novel approach in making thin dense pinhole free hydrogen transparent membrane for high separation flux and low materials cost by using commercial technology of filtered cathodic arc deposition.

**TOPIC: CATALYSIS**

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

Dioxide Materials Inc.  
2021 S First St, Suite 206  
Champaign, IL 61820-7477

**Title:**

DBA Dioxide Recycle Catalysts For Electrochemical Conversion Of CO2

**Summary:**

This project will develop a process to recycle carbon dioxide back to useful chemicals, thereby reducing the carbon footprint of the chemical industry, and making it easier for the nation to meet our global warming goals.

**Company:**

Dynaflow, Inc.  
10621-J Iron Bridge Road  
Jessup, MD 20794-9381

**Title:**

Improving Delignification Using Cavitation

**Summary:**

An energy efficient pretreatment process for lignocellulosic biomass using the DYNAJETS® cavitating jets will be developed to enable efficient extraction of sugar for conversion to biofuels. This technology will reduce the overall production cost of biofuels such as ethanol, and will make U.S. biofuel industry more competitive.

**Company:**

Exelus, Inc.  
110 Dorsa Ave  
Livingston, NJ 07039-1003

**Title:**

Low temperature oxidation of alkanes to alcohols

**Summary:**

This SBIR project will develop a new, cost-effective method for converting abundant, low quality natural gas into methanol which can then be used to make a whole host of products such as transportation fuels and petrochemicals. It uses new chemistry and catalysts to improve energy efficiency while cutting capital costs by half.

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

InnoSense LLC  
2531 W. 237th Street, Suite 127  
Torrance, CA 90505-5245

**Title:**

Coated Aerogel Electrodes for Photoelectrochemical Methanol Formation

**Summary:**

This project will develop alternative energy sources to fossil fuels. This initiative is designed to mitigate the domestic reliance on foreign oil. Here methanol will be produced by conversion of carbon dioxide, a green house gas, directly to methanol through the use of sunlight.

**Company:**

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

**Title:**

Acetaldehyde Manufacture by the Selective Photocatalytic Oxidation of Ethane

**Summary:**

This project will develop a technology that can reduce greenhouse gas emissions, conserve energy, improve efficiency of use of hydrocarbons, and improve U.S. employment in the chemical industry. The selective oxidation technology is also potentially applicable to a wide range of other products from the U.S. chemical industry.

**Company:**

TDA Research, Inc.

12345 W. 52nd Ave.  
Wheat Ridge, CO 80033-1916

**Title:**

Novel Method for Conversion of Biomass to Fuel

**Summary:**

Ethanol is a versatile chemical that is used as a chemical solvent, sterilizer, antifreeze, chemical intermediate, and an oxygenate in fuels. This project will develop a new catalytic process produces ethanol more cheaply than current synthetic processes and uses a renewable feedstock as a raw material.

**TOPIC: HYDROGEN SAFETY, STORAGE, DELIVERY, AND PRODUCTION**

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**Company:**

FuelCell Energy, Inc.  
3 Great Pasture Rd.  
Danbury, CT 06813-1305

**Title:**

Thermochemically Integrated Solid State Hydrogen Separator and Compressor

**Summary:**

This project focuses on the development of a thermally integrated solid-state hydrogen separator and compressor to produce high pressure, high purity hydrogen to meet future hydrogen refueling infrastructure needs.

**Company:**

Reaction Systems, LLC  
19039 E. Plaza Dr., Suite 290  
Parker, CO 80134-8704

**Title:**

A Novel Process for Improved Hydrogen Separation and Recovery

**Summary:**

This project will develop a technology that will allow hydrogen to be produced more economically facilitating the increased use of fuel cells, which will reduce our energy consumption.

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

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**Company:**

RadiaBeam Technologies LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

**Title:**

Ultrashort, high-brightness bunch length diagnostic with sub-femtosecond resolution

**Summary:**

This project will develop an ultrafast diagnostic with an unprecedented timing resolution of subfemtoseconds, the natural time-scale of atomic motion. Such a device will find numerous applications in the areas of medicine, industry, homeland security, and basic research.

**Company:**

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

**Title:**

New High Resolution, Large Area Detector for Synchrotron Applications

**Summary:**

This project will develop a high performance, large area, position sensitive X-ray detector that will have a positive impact on basic science, non-destructive testing and medical studies.

**Company:**

Sydor Instruments, LLC  
31 Jet View Drive  
Rochester, NY 14624-4903

**Title:**

HERMES-Based X-ray Strip Detector

**Summary:**

This project will develop a novel microstrip detector to satisfy immediate needs at synchrotron radiation facilities around the world. Advancements will enable new science by providing a means to measure a full-range diffraction pattern in times on the order of one millisecond.

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Modeling of Diamond Based Devices for Beam Diagnostics

**Summary:**

Advanced high photon ux diagnostic devices are need for the operation and upgrade of 3rd generation light sources and for development of X-ray Free Electron Lasers. This project will develop High fidelity software to enable new capabilities to design advanced, diamond-based beam monitors for next-generation high photon ux diagnostics.

---

**Company:**

Voxtel, Inc.  
12725 SW Millikan Way Suite 230  
Beaverton, OR 97005-1782

**Title:**

Solution-Processed, Large Area, Pixelated Direct-Detection Radiation Detectors

**Summary:**

This project will provide for the need for cost effective, large area, pixilated radiation detectors, a solution processed gamma-detector, which can be ink jet printed, from solution-based precursors is proposed

**TOPIC: RADIO FREQUENCY (RF) DEVICES AND COMPONENTS FOR ACCELERATOR FACILITES**

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**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Title:**

Development of a 402.5 MHz 140 kW Inductive Output Tube

**Summary:**

This project will conduct a successful demonstration of a 400 MHz inductive output tube will provide a high efficiency RF source for driving proton accelerators and muon colliders. IOTs will significantly reduce the cost of these systems.

---

**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Title:**

Development of a 100 kW, 2.815 GHz Klystron

**Summary:**

This project will use an innovative, patented elliptic beam technology to develop a new class of energy efficient, higher power, lower cost inductive output tubes (IOTs). IOTs are used in areas such as leading edge scientific research and digital TV broadcasting.

---

**STTR Project**

**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Title:**

High Power RF Windows for Accelerator Applications

**Summary:**

This project will investigate improved methods for protecting RF windows from catastrophic failures that result in significant costs for the microwave power and high energy physics community. This will increase the power capability of a critical component in these devices.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Solid State Pulsed Power System for a Stripline Kicker

**Summary:**

This project will evaluate kicker driver circuit topologies essential to the next generation of high energy physics particle accelerators worldwide.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Ripple Cancellation Supply

**Summary:**

This project will develop a small supply that cancels this variation, similar to noise-canceling headphones. This will practically eliminate X-ray motion, giving better research results at minimal cost.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Robust High Average Power Modulator

**Summary:**

The modulators that deliver short electrical pulses for the Spallation Neutron Source at Oak Ridge National Laboratory are not yet reliable, despite ten years of development. This project will design a new modulator that is inherently much more reliable, smaller, and significantly less expensive.

---

**Company:**

MTECH Laboratories, LLC  
831 Rte. 67, Bldg. 45C  
Ballston Spa, NY 12020-0227

**Title:**

Novel Switching Devices for Accelerator Modulators

**Summary:**

This project addresses very high power switches for accelerators used in high-energy physics research, which seeks to broaden the understanding of fundamental physical properties. This project will develop improved devices using a novel topology and mode of operation.

---

**Company:**

MTECH Laboratories, LLC  
831 Rte. 67, Bldg. 45C  
Ballston Spa, NY 12020-0227

**Title:**

Efficient High-Voltage IGBT Modules

**Summary:**

The field of cryogenic power electronics promises improved performance over conventional power conversion equipment, as well as seamless integration with extremely low-loss superconducting cables and equipment. This project will develop reliable and high performance packaging technologies, which are necessary to enable such devices.

---

**Company:**

Nokomis, Inc.  
310 5th St.  
Charleroi, PA 15022-1517

**Title:**

Novel Coating Materials for RF Windows

**Summary:**

This project will develop an innovative method to improve accelerator efficiency and assist with high-energy physics research. Building upon expertise in RF applications and materials, window materials that allow for greatly improved power handling capability will be developed.

---

**TOPIC: ADVANCED SOURCES FOR ACCELERATOR FACILITIES**

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**Company:**

Busek Co. Inc.  
11 Tech Circle  
Natick, MA 01760-1023

**Title:**

High Current Negative Hydrogen Ion Source

**Summary:**

This project will combine over two decades of plasma thruster development for space propulsion by applying this technology in a state-of-the-art high current negative ion source. The completed source will allow researchers to achieve scientific advancements beyond current capabilities.

---

**Company:**

Omega-P, Inc.  
258 Bradley St., 2nd fl.  
New Haven, CT 06510-1106

**Title:**

Short-Period RF Undulator for a SASE Nanometer Source

**Summary:**

A compact microwave-driven device will be developed that will cause an energetic electron beam to wobble as it travels along. This can be the basis for a source of short wavelength light for research and medical applications that would be smaller and less expensive than otherwise possible.

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**TOPIC: ANCILLARY TECHNOLOGY FOR ACCELERATOR FACILITIES**

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**Company:**

EPIC Consulting  
101 Mountain Ridge Drive

Mount Sinai, NY 11766-1413

**Title:**

Extend the EPICS Client Metadata Set to Support Arrays, Images, Archive Data and Advanced Directory Services

**Summary:**

This project will produce a well defined, reviewed, and agreed upon definition of the metadata required for proper handling of several array types enables the development of middle layer servers such as orbit and bump control in accelerators.

---

**STTR Project**

**Company:**

Menlo Systems, Inc.  
69 Stickles Pond Road  
Newton, NJ 07860-2781

**Title:**

Femtosecond Timing Distribution and Control for Next Generation Accelerators and Light Sources

**Summary:**

This project will study the feasibility and identify the best approach towards developing a modular femtosecond timing distribution system for next generation accelerators and light sources.

---

**Company:**

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

**Title:**

UV Laser for Laser-Ion Stripping of Hydrogen Beams

**Summary:**

This project will develop a laser that will be one of the key components needed to advance accelerator technology particularly for laser-ion stripping of hydrogen beams and free-electron lasers (FELs). The laser will also find application in micro machining, two photon microscopy and stereo lithography via drilling, solar cell manufacturing and medicine.

---

**Company:**

RadiaBeam Technologies LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

**Title:**

Ultrafast Mid-IR Laser System

**Summary:**

This project will develop a novel laser system capable of producing intense ultrashort infrared laser pulses. Such a laser system is of great benefit to accelerator facilities such as Stanford Linear Accelerator Collider (SLAC). The SLAC, and facilities like it, provide a new window into materials and material properties that are critical to our nation's competitiveness.

---

**Company:**

RadiaBeam Technologies LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

**Title:**

Novel RING Resonator for Laser Ion Stripping

**Summary:**

This project will develop a new way of producing intense charged particle beams, proton beams, using lasers. These beams are at the heart of projects such as the Spallation Neutron Source (SNS). The SNS, and sources like it, provide a new window into materials and material properties that are critical to our nation's competitiveness.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Accelerating Large-Scale Beam Dynamics Simulations with GPUs

**Summary:**

Accelerator-based light sources are among the largest and most advanced scientific instruments used by the DOE-funded researchers. This project will develop GPU-accelerated computational modeling tools that will significantly reduce the time and cost of producing optimal designs for the new, or upgrading the existing, light sources in the DOE portfolio.

---

**Company:**

TechSource, Inc.  
190 Central Park Square, Suite 213  
Los Alamos, NM 87544-0988

**Title:**

Improvements to Simulation Codes for Electron Cloud Generation in Long-Bunch, High-Intensity Proton Accumulator Rings

**Summary:**

This project undertakes the development of improved simulations codes for modeling the electron cloud generation in high intensity proton accumulator rings. These tools will aid in the understanding and mitigation of electron cloud effects in these machines.

**TOPIC: INSTRUMENTATION FOR ELECTRON MICROSCOPY AND SCANNING PROBE MICROSCOPY**

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**Company:**

AppliFlex LLC  
PO Box 159293  
Nashville, TN 37215-9293

**Title:**

Laser In-Situ Diagnostics and Processing Probes for Electron Microscopes

**Summary:**

The assembly and fabrication of nanomaterials into a useful structure and devices remains a grand challenge in nanotechnology. This project will develop a novel method and tool for processing, in-situ live imaging and characterization of materials in nanoscale by combining the laser technology with electron microscope instrument.

**Company:**

Hummingbird Precision Machine Inc.  
3340 Windolph Lane  
Olympia, WA 98502-3837

**Title:**

Development of an Ultra Low Expansion Transmission Electron Microscopy in Situ Heating Holder

**Summary:**

Exposure of materials to high temperatures can allow exploration of material changes or an improved understanding of the structure-property relations in materials. This project will yield hardware that will allow scientists to more completely characterize such materials at nano-scale resolution in a transmission electron microscope.

**Company:**

Physical Sciences Inc.  
20 New England Business Center  
Andover, MA 01810-1077

**Title:**

Time-Domain Terahertz Apertureless Near-Field Scanning Optical Microscopy

**Summary:**

This project will develop a new scientific instrument that will combine terahertz imaging with an atomic force microscope. This instrument will provide new capability to scientists in multiple disciplines, enabling measurements that are not possible with current technology.

**TOPIC: INSTRUMENTATION FOR MATERIALS RESEARCH USING SYNCHROTRON RADIATION**

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**Company:**

Jema Science, Inc  
1530 Grand Ave.  
Piedmont, CA 94611-4330

**Title:**

Smart Combinatorial Research Equipment (SmartCoRE) for Automated Sample Analysis and Environmental Control on Synchrotron Beamlines

**Summary:**

This project will develop an innovative device for economically accelerating the discovery of energy critical materials.

**Company:**

Mechanical Solutions, Incorporated  
11 Apollo Drive  
Whippany, NJ 07981-1423

**Title:**

A System for Conducting Sophisticated Mechanical Tests In Situ with High Energy Synchrotron X-Rays

**Summary:**

To gain a better understanding of why structures such as bridges, dams, and airplanes fail, x-rays are used to experimentally characterize these failures in a controlled laboratory setting. This project will develop a specialized machine that can induce fracture and fatigue—two common sources of failures—for use in x-ray experiments enabling scientists to better explore these failures.

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

Royston Engineering Research LLC  
1025 West Vernon Park Place, Unit A  
Chicago, IL 60607-3448



**Title:**

A New Paradigm for X-ray Optics Nanopositioning

**Summary:**

This project will develop a novel X-ray optics positioning system that has sub-nanometer resolution enabling orders of magnitude resolution improvement in materials research at synchrotron facilities. This in turn will lead to advances in commercial applications and products being pioneered by material science users of such facilities.

---

**Company:**

STAR Cryoelectronics, LLC  
25 Bisbee Ct., Ste. A  
Santa Fe, NM 87508-1338

**Title:**

Advanced STJ-based X-Ray Spectrometer for Synchrotron Science Applications

**Summary:**

This project will develop an advanced X-ray spectrometer based on an array of superconducting tunnel junction (STJ) detectors for synchrotron science applications. The nextgeneration X-ray spectrometer design will be cryogen-free with automated controls to simplify and streamline operation. The turn-key instrument will be easily mountable to beamlines at synchrotron facilities.

---

**Company:**

Voxtel, Inc.  
12725 SW Millikan Way Suite 230  
Beaverton, OR 97005-1782

**Title:**

High Speed Germanium X-Ray Photon Counting Detector Array

**Summary:**

To fully enable the capability of our nation's synchrotrons, a germanium X-ray photon detector and signal processing chip will be developed for high speed X-ray photon counting experiments.

**TOPIC: INSTRUMENTATION AND TOOLS FOR MATERIALS RESEARCH USING NEUTRON SCATTERING**

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

Adelphi Technology, Inc.  
2003 East Bayshore Road  
Redwood City, CA 94063-4121

**Title:**

Development of Superconducting Wollaston Prisms

**Summary:**

Neutron beams are a powerful materials science probe that provides unique information about the structure of matter. This project increases the signal available and the range of structure sizes that can be seen using neutrons, enabling the understanding and development of new industrial and biological materials.

---

**Company:**

Materials Development, Inc.  
3090 Daniels Court  
Arlington Heights, IL 60004-1234

**Title:**

Extreme Sample Environment for Neutron Measurements

**Summary:**

This project will develop an advanced materials research using neutrons that is critical in making technological advances in areas such as genetics, "smart materials" for aircraft, high capacity data storage, energy, and security technologies. This project will have a strong impact on U.S. capabilities in advanced materials, energy technology and manufacturing competitiveness.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Computational and Data Analysis System for Multi-Technique Rapid Tomography Reconstruction and Quantification Processing

**Summary:**

This project will develop a toolkit that will enable rapid image processing and 3D reconstruction at largescale neutron and x-ray facilities to enhance our ability to understand drug development, biological processes, and environmental sciences.

**TOPIC: NOVEL MEMBRANE AND ELECTRODE DEVELOPMENT FOR ADVANCED ELECTROCHEMICAL ENERGY STORAGE**

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**Company:**

Altairnano  
204 Edison Way  
Reno, NV 89502-2306

**Title:**

Inorganic Electrode Coatings for Increased Temperature and Cycle Life Performance

**Summary:**

This project will increase the cell stability of our batteries by altering the chemistry of cells through processes compatible with our current fabrication abilities.

---

**Company:**

Amsen Technologies, LLC  
1684 S. Research Loop, Suite 518  
Tucson, AZ 85710-6740

**Title:**

Low-Cost, High-Performance Hybrid Membranes for Redox Flow Batteries

**Summary:**

This project will develop a low-cost, high performance hybrid membrane for redox flow batteries, which is a technology of significant potential for stationary electrical energy storage to be used with wind or solar power generation.

---

**Company:**

EIC Laboratories, Inc.  
111 Downey Street  
Norwood, MA 02062-2612

**Title:**

Low Cost and Highly Selective Composite Membrane for Redox Flow Batteries

**Summary:**

This project will develop highly economical components for redox flow batteries that will provide cost effective energy storage of renewable resources and also impact the efficiency of the electrical energy transmission grid.

---

**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840-4023

**Title:**

Highly Selective Proton-Conducting Composite Membranes for Redox Flow Batteries

**Summary:**

This project will develop a low-cost and highly selective proton-conducting composite membranes can enable the development of cost-effective and durable power systems for stationary applications. It also helps efficient use of electricity generated from renewable energy sources and reducing emissions.

---

**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840-4023

**Title:**

Advanced Electrodes for Low-Cost, Long Cycle Life Li-ion Batteries

**Summary:**

Distributed energy storage is essential to increase grid stability, decrease fossil fuel use, increase asset utilization, and smooth output of renewable sources. This project will develop advanced rechargeable batteries that will improve utility-scale batteries' cycle life, performance, reduce negative environmental effects, and provide cost-effective energy storage solutions.

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**TOPIC: HIGH PERFORMANCE MATERIALS FOR NUCLEAR APPLICATION**

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**Company:**

Hyper-Therm High-Temperature Composites, Inc.  
18411 Gothard Street, Unit B  
Huntington Beach, CA 92648-1208

**Title:**

Design Validation of Gen IV Composite Control Rod Sheaths

**Summary:**

Test methods must be developed and standardized to validate the design and use of new materials within nuclear reactors. This project will develop Gen IV high temperature gas reactors that offer the production of lower cost electricity due to their high efficiency achieved by high temperature operation. However, the use of new materials, such as ceramic composites, is required to meet the temperature requirements of these reactors.

---

**Company:**

Intelligent Fiber Optic Systems Corporation  
2363 Calle Del Mundo  
Santa Clara, CA 95054-1008

**Title:**

On-Line Monitoring of Flow-Accelerated Corrosion for Nuclear Power Plants

**Summary:**

Safely harnessing the power of nuclear energy and economically and efficiently converting this can benefit the planet by reducing reliance on fossil fuels. This project will develop a robust fiber-opticsensor-based measurement tool to monitor key NPP stressors, extend the life of legacy LWRs, and provide greatly improved safety margins against potentially catastrophic pipe failures.

---

**Company:**

Lambda Instruments, Inc.  
40 University City Blvd  
Suite 4  
Blacksburg, VA 24060-2708

**Title:**

In-Situ Mechanical Characterization of Refractory Materials up to 1600??C for Gen-IV Reactors using Sapphire Fiber Optic Sensors

**Summary:**

Nuclear energy is widely held as being the only viable source of abundant, CO2 emissions-free electrical energy capable of meeting projected needs in the near term. This project will develop a sensor technology which will enable the safe operation of emerging nuclear reactor designs.

**TOPIC: ADVANCED COAL RESEARCH**

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**Company:**

525 Solutions, Inc.  
32 Audubon Place  
Tuscaloosa, AL 35401-1902

**Title:**

Catalytic Fractionation of Biomass In Ionic Liquids

**Summary:**

This project will develop a novel method for lignocellulosic biomass fractionation utilizing IL technology. Clean fractionation of the three major components of biomass will lead to low cost, efficient processes that will provide clean lignin, cellulose, and hemicellulose feedstocks from virtually any lignocellulosic biomass and which can be input directly in biomass to chemicals and fuel technologies.

---

**Company:**

Advanced Cooling Technologies, Inc.  
1046 New Holland Ave.  
Lancaster, PA 17601-5606

**Title:**

Syngas Production by Thermochemical Conversion of H2O and CO2 Mixtures Using a Novel Reactor Design

**Summary:**

This project will use CO2 and H2O in a thermochemical cycle to efficiently produce syngas. The proposed technology (i) does not require coal, methane or other hydrocarbon feedstocks (ii) can operate without catalysts, and (iii) can be expanded for commercial production of fuels such as syngas, methane and other hydrocarbon derivatives.

---

**Company:**

Eltron Research & Development Inc.  
4600 Nautilus Court South  
Boulder, CO 80301-3241

**Title:**

A Compact Integrated System for Air Capture of Atmospheric CO2

**Summary:**

Although CO2 is considered an undesirable emittant from power plants and other facilities, developing the ability to exploit it first requires its capture. This project addresses the capture of atmospheric levels of CO2 with concomitant electrochemical reduction.

---

**Company:**

Shakti Technologies, Inc.  
728 Garland Drive  
Palo Alto, CA 94303-3603

**Title:**

Novel Nanosorbents for Air CO2 Capture

**Summary:**

This project will develop a process for removal of carbon dioxide from air, to mitigate the harmful effects of global warming on future generations.

**TOPIC: FOSSIL ENERGY ADVANCED RESEARCH**

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**Company:**

Boston MicroSystems Inc.  
30-H Sixth Road  
Woburn, MA 01801-1758

**Title:**

Harsh Environment Gas Composition Sensor Using Novel SiC Resonant MEMS

**Summary:**

This project will develop a multi-analyte gas sensor that operated in high pressure and temperature condition that will be extremely significant to both commercial energy producers and the Federal government in enabling advanced energy systems including combustion, gasification, fuel cells, and gas turbines.

---

**Company:**

CFD Research Corporation  
215 Wynn Drive, NW  
5th Floor  
Huntsville, AL 35805-1944

**Title:**

Quantum Mechanic Based Reactive Potentials for Rapid and Reliable Prediction Of Material Properties for Advanced fossil Energy Systems

**Summary:**

The development of novel materials for advanced fossil energy systems remains slow because it is driven by trial-and-error experimental approach and lacks a rational design approach. This project will develop database of Quantum Mechanic-based reactive interatomic potentials for predictive modeling of properties of novel materials for advanced fossil energy systems such as slagging gasifier and ultrasupercritical steam plant in advance of fabrication.

---

**Company:**

CPFD Software, LLC  
10899 Montgomery Blvd. NE, Suite B  
Albuquerque, NM 87111-3935

**Title:**

Hybrid CPU-GPU Parallel Development of the Eulerian-Lagrangian Barracuda Multiphase Program

**Summary:**

Accelerating computational power from a commercial engineering software tool (Barracuda) can help designers optimize fossil power plants and develop gasification reactors for coal and biomaterial, while reducing greenhouse gases.

---

**Company:**

KCF Technologies, Inc.  
112 West Foster Avenue  
State College, PA 16801-4867

**Title:**

Energy Harvester Powered Wireless Sensors for Extreme Temperature Environments

**Summary:**

This project will provide an energy harvester powered sensors for high temperature environments. This project addresses a significant opportunity to impact power plant energy consumption and operating cost by enabling wireless sensing at a low cost and in high temperature environments.

---

**Company:**

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

**Title:**

Wireless Seebeck Power

**Summary:**

This project will support wireless sensors monitoring power plants, a new class of power-harvesting systems is required. A new nanomaterial-based thermoelectric device is proposed that will be capable of converting waste heat to power at a low cost, and will be more reliable and easier to manufacture than current technology.

---

**Company:**

Physical Sciences Inc.  
20 New England Business Center  
Andover, MA 01810-1077

**Title:**

Novel Gas Composition Sensor System for Monitoring Power Generation Systems

**Summary:**

This project will develop a novel laser-based system that will leverage technology from the optical telecommunications industry to monitor gas species concentrations in advanced power generation systems. These measurements may be used to improve efficiency in combustion systems and develop future control strategies to reduce emissions. The novel sensor system may also be used to measure pollutants and greenhouse gases including carbon dioxide produced by factories and vehicles.

---

**Company:**

Techno-Sciences, Inc.  
11750 Beltsville Drive Suite 300  
Beltsville, MD 20705-3194

**Title:**

Galphenol Energy Harvester for Wireless Sensors

**Summary:**

This project will use an innovative energy harvester device which provides long term power suitable for wireless sensor networks using advanced materials to convert vibration energy, readily available, into useful electrical energy. The benefit of such an approach is a retro-fit capable wireless sensor system which allows for real-time monitoring of power plant processes without introducing significant integration related issues and the ability to reconfigure the wireless system as desired.

---

**Company:**

Wireless Sensor Technologies, LLC  
1020 Glen Arbor Drive  
Encinitas, CA 92024-2443

**Title:**

Self Powered Wireless Sensor System for Power Generation Applications

**Summary:**

This project will develop and demonstrate a high reliability waste heat-enabled power supply and wireless sensor system for power generation applications. The system will consist of networked sensor nodes containing pressure and temperature sensors that may be used in the hot sections of turbine engines and mounted on rotating components enabling condition-based maintenance for a power generation plant.

**TOPIC: CLIMATE CONTROL TECHNOLOGY FOR FOSSIL ENERGY APPLICATION**

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**STTR Project**

**Company:**

Algorithmica LLC  
7204 Via Vico  
San Jose, CA 95129-3536

**Title:**

Verification of CO2 Storage in Coal Beds

**Summary:**

This project will develop the capture and injection of industrial CO2 emissions in un-minable coal seams has been proposed to reduce their impact on global warming. The acceptance of this strategy depends on effective seismic monitoring and verification procedures, as proposed herein, to prevent leakage, ensure safety, and ensure compliance with government policies.

---

**Company:**

Aspen Aerogels, Inc.  
30 Forbes Road, Bldg B  
Northborough, MA 01532-250

**Title:**

Superhydrophobic Aerogel as Sorbent Material for CO2 Capture

**Summary:**

This project will develop a novel CO2 capture solid sorbent for coal fired power plants. The novel aerogel sorbent will 1) effectively remove the CO2 from post combustion flue gas, 2) will be regenerated at low temperature, and 3) will be suited for multiple-cycle use. The new developed technology will enable to retrofit the existing fleet of coal-fired power plants for carbon capture and minimize global warming caused by greenhouse gas emissions.

---

**STTR Project**

**Company:**

Envergex, LLC  
10 Podunk Road  
Sturbridge, MA 01566-1046

**Title:**

Capture of CO2 by Hybrid Sorption (CACHYS) for Existing Coal-Fired Plants

**Summary:**

This project will develop a technology to harnesses the synergy between unique sorbents that have been developed, with a novel method of using those sorbents, to capture of CO2 from power plant exhaust gases. It is expected to reduce the cost of CO2 capture by a factor of two relative to current solutions.

---

**Company:**

Intelligent Optical Systems, Inc.  
2520 W. 237th Street  
Torrance, CA 90505-5217

**Title:**

Distributed Sensors for Dissolved Carbon Dioxide

**Summary:**

This project will develop reliable and cost-effective monitoring that is important to making gas sequestration an acceptable method of carbon dioxide control. Distributed sensors are proposed for large-scale detection and quantification of the effects of carbon dioxide leaks into shallow water of storage locations.

---

**STTR Project**

**Company:**

NanoSonic, Inc.  
1485 South Main Street  
Blacksburg, VA 24060-5556

**Title:**

Climate Control Technology for Fossil Energy

**Summary:**

This project will use captured CO<sub>2</sub> from coal fired power plants to subsequently replace toxic solvents in a wide range of polymer processing operations. Marketability will be ensured by dynamic applicability to multiple commercial and consumer markets, combined with low materials costs.

---

**STTR Project**

**Company:**

NexTech Materials, Ltd.  
404 Enterprise Drive  
Lewis Center, OH 43035-9423

**Title:**

Advanced Membranes for CO<sub>2</sub> Capture from Existing Coal-fired Power Plants

**Summary:**

This project will investigate a new membrane for separation of carbon dioxide from coal-fired power plant gas exhaust. This technology could lead to cleaner and more efficient coal-fired power plants.

---

**Company:**

Paulsson, Inc.  
PO Box 8819  
Brea, CA 92822-5819

**Title:**

Development of a 1,000 level Borehole Seismic Receiver Array for Characterization of CO<sub>2</sub> Repositories

**Summary:**

This project will develop Borehole seismic 3D imaging using ultra long borehole seismic receiver arrays designed and built to withstand the severe environment in boreholes used for the sequestration of CO<sub>2</sub> is the only geophysical technique that can map and monitor in high resolution if a geologic formation is suitable for CO<sub>2</sub> storage.

---

**Company:**

SHEETA Global Technology Corporation  
1036 Countryside Drive  
Walnut, CA 91789-4393 Sequestration Site

**Title:**

Subsurface Monitor for Dissolved Inorganic Carbon at Geological

**Summary:**

This project will develop the competitive technology for U.S. leadership in the MVA of CO<sub>2</sub> at geological sequestration site, creating green energy jobs, and create new business and technology.

---

**Company:**

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

**Title:**

High Value Renewable Chemical Production from CO<sub>2</sub> and Biodiesel Plant Byproduct

**Summary:**

This project will develop an environmentally friendly, cost-effective, energy-efficient, and easy to operate renewable glycerol carbonate production technology from carbon dioxide, which is a greenhouse gas, and glycerol, a biodiesel plant waste.

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**TOPIC: COAL GASIFICATION TECHNOLOGIES**

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**Company:**

Creative Power Solutions (USA), Inc.  
11010 N. Saguaro Blvd., Suite 206  
Fountain Hills, AZ 85268-5562

**Title:**

A Novel Concept for Preferential Production of Methane Rich Syngas from Coal Gasification

**Summary:**

This project will develop a gasifier that will combine coal and a renewable waste to produce methane rich syngas in a cost effective manner. This technology will reduce the cost of power generation, enhance lifetime of fossil fuel resources, and provide a cost effective method to reduce emission of greenhouse gases from coal based power plants.

---

**Company:**

Reaction Engineering International  
77 West 200 South, Suite 210  
Salt Lake City, UT 84101-3601

**Title:**

A Technology to Mitigate Syngas Cooler Fouling

**Summary:**

This project will develop a soot blowing technology tailored for use in coal gasification plants. This technology will improve the performance of coal gasification plants, thereby reducing U.S. dependence on foreign energy sources and greenhouse gas emissions.

---

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

Reaction Engineering International  
77 West 200 South, Suite 210  
Salt Lake City, UT 84101-3601

**Title:**

Enhanced Methane Production by Co-Gasification of Potassium-Rich Biomass and Coal

**Summary:**

This project will investigate enhanced methane production from the co-gasification of potassium-rich biomass and coal. The gas produced will be suitable to fire a fuel cell or to provide substitute natural gas to a pipeline. This process will reduce U.S. dependence on foreign energy sources and greenhouse gas emissions.

---

**Company:**

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

**Title:**

Method for Co-Feeding Biomass and Coal for Gasification

**Summary:**

This project will develop a method to pre-process and co-feed biomass with coal for gasification without the penalties associated with the low energy density, handling or feeding problems associated with whole biomass. This will significantly increase the use of renewable resources for fuels and power production, while proportionately reducing the carbon footprint of coal utilization.

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**TOPIC: TECHNOLOGIES FOR CLEAN FUELS AND HYDROGEN FROM COAL**

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**Company:**

Cadtrak Engineering, LLC  
31 Santa Barbara Ave.  
San Anselmo, CA 94960-1653

**Title:**

Algae Filtration and Oil Extraction Device

**Summary:**

This project involves the development of a device to harvest and extract oil from algae for the production of biofuels. Algae-based biofuels have the potential to alleviate the problem of CO<sub>2</sub> emissions from fossil fuels and to lower U.S. reliance on foreign sources of energy.

---

**Company:**

Energy Catalysis Inc.  
1200 Florence Columbus Road, Suite 117  
Burlington, NJ 08505-4200

**Title:**

Economical Process for Conversion of Biomass and Coal to Liquid Fuels

**Summary:**

This project will develop a direct liquefaction of renewable biomass and vast reserve of coal in U.S. to transportation fuels that will lead to energy independence from foreign oil and boost in the economy. An economical process for direct liquefaction of biomass and coal by hydroconversion in a low cost reactor system using novel catalysts.

---

**Company:**

Exelus, Inc.  
110 Dorsa Ave  
Livingston, NJ 07039-1003

**Title:**

Multifunctional Catalyst for Coal and Biomass to Liquids Process

**Summary:**

This project will develop a new, cost-effective method for converting coal and biomass into clean transportation fuels. It uses new chemistry and catalysts to improve energy efficiency and reduce GHG emissions while significantly reducing capital costs.

---

**Company:**

QuarTek Corporation  
4180 Piedmont Parkway  
Greensboro, NC 27410-8109

**Title:**

Specially Functionalized Nanomagnetic Particles and Ionic Liquids for Harvesting, Dewatering and Extraction of Lipids and Carbohydrates from Algae

**Summary:**

This project will develop a new job creating industry, creating technologies that will enable the production of cost effective biofuels from cellulosic and algal biomass by employing novel separation and extraction technology.

**Company:**

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

**Title:**

Poison Resistant Water-Gas-Shift Catalyst for Biomass and Coal Gasification

**Summary:**

This project will develop a new catalyst that will allow more efficient fuels production from coal and biomass while minimizing the number of steps involved.

**Company:**

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

**Title:**

Poison-Tolerant WGS Catalyst for Biomass-Coal Co-Gasification Systems

**Summary:**

This project will develop an enabling technology for Coal-Biomass-to-Liquids (CBTL) processes. The CBTL system uses domestic feedstock and will have a greenhouse gas footprint better than conventional coal or petroleum fuels allowing a highly efficient and environmentally responsible utilization of coal.

**STTR Project**

**Company:**

Technology Assessment and Transfer, Inc  
133 Defense Hwy, 212  
Annapolis, MD 21401-8907

**Title:**

Novel Ceramic Membranes for Efficient Hydrogen Recovery

**Summary:**

This project will develop an all-ceramic separation membrane module to cleanly recover hydrogen gas from coal. This module will increase the efficiency of the process and eliminate U.S. dependence on precious metals used for hydrogen separation.

**TOPIC: ADVANCED TURBINE TECHNOLOGY FOR IGCC POWER PLANTS**

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Innovative Science Engineering and Management LLC  
7525 B State Road  
Cincinnati, OH 45255-6406

**Title:**

A Novel Micro Circuit Based Film Cooling Design for a Ceramic Combustor Liner

**Summary:**

This project will develop a unique approach to design and fabrication of a high temperature SiC/SiC CMC combustor liner. It offers diverse applications for increasing cycle efficiency, and low emissions in commercial power plants, DOE as well as DOD/DARPA fighter platforms.

**Company:**

Technology Assessment and Transfer, Inc  
133 Defense Hwy, 212  
Annapolis, MD 21401-8907

**Title:**

Rapid Prototyping and Manufacturing of Cast Turbine Components

**Summary:**

This project will develop digital manufacturing technology that will provide > 75% cost savings and reduce prototype lead times by >50% for cast metal components used in advanced gas turbines. This technology will enable much more rapid innovation and result in higher efficiency turbine engines.

**STTR Project**

**Company:**

UES, Inc.  
4401 Dayton-Xenia Road  
Dayton, OH 45432-1894

**Title:**

High Temperature Unique Low Thermal Conductivity Thermal Barrier Coating (TBC) Architectures

**Summary:**

Gas turbine engines utilized in electric power production and aircraft propulsion need to operate at higher temperatures for enhanced efficiency and lower emission. This project will develop a thermal barrier coating technology with unique architectural design will enable the operation of turbine engines at higher operating temperature.

**TOPIC: FUEL CELL TECHNOLOGIES FOR CENTRAL POWER GENERATION**



## WITH COAL

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**Company:**

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

**Title:**

Direct Utilization of Coal in Fuel Cells

**Summary:**

This project will create a breakthrough technology, the Liquid Tin Anode Solid Oxide Fuel Cell that has the potential to revolutionize power production through the direct conversion of coal to electricity. This technology will use coal or biomass in a clean, efficient manner, contributing to our nation's energy security and environmental quality.

---

**Company:**

NexTech Materials, Ltd.  
404 Enterprise Drive  
Lewis Center, OH 43035-942

**Title:**

Manufacturing System Design Analysis of SOFC Stacks

**Summary:**

This project will perform a comprehensive manufacturing cost analysis of volume manufacturing of SOFC stacks. Design, materials, and fabrication methods will be evaluated to reduce total system cost, enabling penetration into stationary power generation markets, transportation auxiliary power units, and military applications.

---

**Company:**

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

**Title:**

Post-SOFC Residual Fuel Oxidizer for CO2 Capture

**Summary:**

This project will capture CO2 produced when using a solid oxide fuel cell to make power from coal derived syntheses gas. It is an extremely efficient low cost process that will increase energy security by using domestic energy resources (coal) for power production while reducing environmental impacts, including atmospheric CO2 emissions.

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## TOPIC: OIL AND GAS TECHNOLOGIES

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**Company:**

ABS Materials  
770 Spruce Street  
Wooster, OH 44691-0000

**Title:**

Swellable Organosilica Materials to Clean Produced Water

**Summary:**

This project will develop and improve identified technologies to remediate produced water; and develop process of production to make these technologies commercially viable.

---

**Company:**

ChemEOR, Inc.  
841 E. San Bernardino Road  
Covina, CA 91723-1417

**Title:**

Novel Self-Thickening Chemicals for Improved Conformance Control

**Summary:**

This project will develop a cost-effective, improved chemical technology to increase oil production from mature fields in the U.S.. This technology also has the environmental benefit of decreasing the volume of water co-produced with the oil.

---

**Company:**

Intelligent Fiber Optic Systems Corporation  
2363 Calle Del Mundo  
Santa Clara, CA 95054-1008

**Title:**

Robust and Self-Contained Fiber-Optic Gyroscope for Measurement While Drilling in Harsh Downhole Environment

**Summary:**

Increased efficiency and cost effectiveness of oil and gas well drilling reduce the overall cost of fossil and unconventional fuel production in the US. This project will develop a highly efficient sensing system to provide feedback for optimizing directional drilling processes, lowering carbon footprint, and enhancing energy security of the nation.

---

**Company:**

Precision Combustion, Inc.  
410 Sackett Point Road

North Haven, CT 06473-3106

**Title:**

Downhole Oxyfuel Steam/CO2 Generator for Production of Gas from Hydrates

**Summary:**

This project will demonstrate a novel oxyfuel downhole steam generator aimed at providing an enabling tool to efficiently recover gas from methane hydrate deposits and simultaneously reduce emissions with potential CO2 sequestration. Success will lead to commercialization of a downhole combustor for natural gas production.

**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 Quantum Cascade Laser System For Simultaneous Measurements of  $^{13}\text{CH}_4$  and  $\text{CH}_3\text{D}$  Methane Isotopologues

**Summary:**

Methane is the second most important greenhouse gas contributing to global warming. This project will produce a laser based isotopic methane monitor that will be used to quantify the various sources of atmospheric methane based on their distinct isotopic signatures in order to assess the impact of methane on global warming and climate change.

**Company:**

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

**Title:**

The Photo-Pneumatic CO2 Analyzer for Robotic Platforms

**Summary:**

This project will develop a new technology platform that is intended to provide global three dimensional monitoring of carbon dioxide from ground level to the top of the atmosphere.

**Company:**

Searchlight Sensors, Inc.  
1100 N. Tustin Ave., Suite G  
Santa Ana, CA 92705-3509

**Title:**

High Precision Optical Carbon Dioxide Sensor

**Summary:**

This project will develop a low cost high precision optical carbon dioxide sensor. This sensor will help to understand the global warming process much more quantitatively and provide real time high sensitivity measurements.

**Company:**

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

**Title:**

Self-calibrating Balloon-Borne Methane Gas Sensor

**Summary:**

Understanding the effects of atmospheric constituents on climate requires highly sensitive field measurements, yet current instrumentation is inadequate to provide the detailed information necessary. This project will develop a compact, rugged, low cost optical sensor platform for airborne measurement of nitric acid and other important atmospheric trace gases.

**Company:**

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

**Title:**

Robust Spectrometer for Carbon Isotope Ratio Measurements

**Summary:**

This project will develop an improved measurement technology that is needed to better characterize the exchange and transformation of carbon between the biosphere and the atmosphere.

**Company:**

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

**Title:**

Trace Carbon Monoxide Analyzer

**Summary:**

This project will develop a field deployable sensor to monitor atmospheric concentrations of the critical indirect greenhouse gas carbon monoxide. It will have significant advantages when compared to existing technology.

---

**Company:**

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

**Title:**

Atmospheric Methane Analyzer

**Summary:**

This project will develop a cost-effective field deployable sensor to monitor atmospheric concentrations of the critical greenhouse gas methane. It will have significant advantages when compared to existing technology.

**TOPIC: ENHANCED AVAILABILITY OF CLIMATE MODEL OUTPUT**

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**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Serving Climate Data to Industry End-users

**Summary:**

This project will develop software that will provide the solar power industry and water management authorities estimates for available solar energy, precipitation and snow distribution based on available climate computer model data.

**TOPIC: ATMOSPHERIC MEASUREMENT TECHNOLOGY**

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**Company:**

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

**Title:**

High Sensitivity SO<sub>2</sub> Monitor using Quantum Cascade Laser IR Absorption

**Summary:**

Understanding the effects of atmospheric constituents on climate requires highly sensitive field measurements, yet current instrumentation is inadequate to provide the detailed information necessary. This project will develop a compact, rugged, low cost optical sensor platform for airborne measurement of nitric acid and other important atmospheric trace gases.

---

**Company:**

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

**Title:**

Chemical Ionization Time-of-Flight Mass Spectrometer for Particle and Gas-Phase Organic Speciation

**Summary:**

Small airborne particles generated from energy-related activities can adversely impact global climate, human health, and visibility. This project will 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 atmospheric particulate matter.

---

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

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

**Title:**

Extending Measurements of Atmospheric Nano-Particle Chemistry to 2 nm

**Summary:**

Understanding sources and global concentrations of particles that nucleate cloud formation is a critical component to evaluating anthropogenic influences on global climate. This project will help illuminate one of the important sources of these particles, namely newly formed particles. More specifically, it will enable the study of the chemical constituents that play an important role in the dynamics of these particles.

---

**Company:**

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

**Title:**

To Separate Particulate and Gaseous Constituents of Atmospheric Aerosols

**Summary:**

Understanding sources and global concentrations of particles is a critical component to evaluating anthropogenic influences on global climate. This project will enable the more accurate measurement of one component of these particles, namely semi-volatile organic compounds which contribute to particle formation in the atmosphere, and may play a significant role in production of those particles that seed the formation of clouds.

---

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

Droplet Measurement Technologies  
2545 Central Avenue  
Boulder, CO 80301-2865

**Title:**

Mobile Ice Nucleus Counter

**Summary:**

Clouds are a critical component of the hydrologic cycle and the role of clouds in climate is equally as critical. This proposal is for the development of a commercial Ice Nucleus (IN) counter which will provide for additional progress in the understanding of ice cloud formation.

---

**Company:**

Luminit, LLC  
1850 W. 205 Street  
Torrance, CA 90501-1526

**Title:**

Holographic A-band Multi-Channel Substrate Guided Wave-Based System

**Summary:**

This project will develop stable, compact, low-cost spectrometer for atmospheric oxygen A-band spectrometry based on substrate-guided wave-based holographic gratings. Global warming can be studied more effectively with this high precision, robust, and stable device.

---

**Company:**

Photon Machines, Inc.  
15377 NE 90th St.  
Redmond, WA 98052-3562

**Title:**

Towards Simultaneous Single Particle Chemical and Optical Characterization: Development of a Multi-angle Optical Scattering Module for the Aerosol Time-of-Flight Mass Spectrometer

**Summary:**

This project tackles one of the largest uncertainties in climate change research, building a unique instrument which simultaneously measures the chemistry and the climactic warming or cooling effect of different types of atmospheric particles. This new instrument is expected to dramatically reduce the uncertainties in climate models, better-informing public policy decisions.

---

**Company:**

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

**Title:**

Instrumentation for Measurement of Atmospheric Nitric Acid

**Summary:**

Understanding the effects of atmospheric constituents on climate requires highly sensitive field measurements, yet current instrumentation is inadequate to provide the detailed information necessary. This project will develop a compact, rugged, low cost optical sensor platform for airborne measurement of nitric acid and other important atmospheric trace gases.

---

**TOPIC: TECHNOLOGIES FOR SUBSURFACE CHARACTERIZATION AND MONITORING**

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

Glomics, Inc  
716 Waterwood Dr.  
Norman, OK 73072-4369

**Title:**

Development of Microarrays-based Metagenomics Technology for Monitoring Sulfate-Reducing Bacteria in Subsurface Environments

**Summary:**

This project will greatly assist the commercialization of GeoChip technologies. GeoChip is a metagenomic technology for simultaneously monitoring thousands of microorganisms important to energy, environmental management, agriculture, industry, foods, and human health.

---

**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840-4023

**Title:**

Contaminant Specific Biosensor for Monitoring Heavy Metal and Radionuclide Bioremediation

**Summary:**

This project will develop a novel biosensor to provide a real-time measurement of bioremediation rates of heavy metal and radionuclide contamination. The novel biosensor could lead to reduced costs and increased acceptance of bioremediation strategies.

---

**STTR Project**

**Company:**

Vista Clara Inc.  
2615 W Casino Road, Suite 4-JK  
Everett, WA 98204-2124

**Title:**

Integrated Use of Surface and Subsurface NMR for Measuring and Mapping Saturated Hydraulic Conductivity in Three Dimensions

**Summary:**

This project will develop and demonstrate a cost-effective, minimally invasive field method for using NMR geophysics to measure and map hydraulic conductivity in the top 100m of the subsurface. The proposed methodology will provide reliable, higher-resolution information on this key subsurface property for improved understanding and remediation of contaminated groundwater.

---

**Company:**

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

**Title:**

Isotope Hygrometer for in situ Subsurface Characterization

**Summary:**

This project will develop an isotope analyzer that can determine the isotope composition of liquid water samples. It will allow tracing the transport and dispersion of contaminants in the subsurface.

**TOPIC: IMAGING AND RADIOCHEMISTRY**

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**Company:**

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

**Title:**

Novel Concept in PET Imaging

**Summary:**

This project will investigate a promising detector technology, which 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:**

New Room Temperature Semiconductor Detectors for Small Animal SPECT

**Summary:**

This project will develop a high performance, low cost detector for nuclear medicine. High performance gamma-ray detectors that operate at room temperature are critical to many applications including nuclear medicine.

---

**Company:**

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

**Title:**

High Resolution High Sensitivity Sensor for Radionuclide Imaging

**Summary:**

This project will permit rapid, economical manufacturing of high performance radiation sensors critical to addressing the immediate needs of nuclear medicine, and allow development of superior methods, drugs and technologies to diagnose and stage, and treatments to curtail and even cure, certain cancers, heart diseases and circulatory system disorders.

---

**Company:**

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

**Title:**

Low Cost, High Performance SPECT Detectors

**Summary:**

This project will investigate promising nuclear detector materials that will have major impact in medical imaging, physics, homeland security, scientific studies as well as commercial applications.

**TOPIC: GENOMIC SCIENCE AND RELATED BIOTECHNOLOGIES**

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**STTR Project**

**Company:**

Glomics, Inc  
716 Waterwood Dr.  
Norman, OK 73072-4369

**Title:**

Development of Novel Random Network Theory-Based Approaches to Identify Network Interactions Among Nitrifying Bacteria

**Summary:**

This project will develop novel ecological network approaches to characterize network interactions of microbial communities represents transformative advances in biological/environmental sciences, and this will greatly enhance the commercialization of GeoChip technologies, which was awarded as one of the 100 most technological innovations with the greatest commercial potentials in 2009.

---

**STTR Project**

**Company:**

MulticoreWare, Inc.  
21536 Saratoga heights Drive  
Saratoga, CA 95070-5757

**Title:**

Metagenomics Using Graphics Processing Units

**Summary:**

This project will develop software for DNA sequence processing from DOE projects which runs on the graphics processing units available in modern computers. This software should accelerate the processing of DNA sequence enough to replace supercomputers used for this purpose with ordinary, much cheaper computers.

---

**Company:**

Vcrsoft LLC  
2310 Bamboo Drive Suite J303  
Arlington, TX 76006-5952

**Title:**

Semantic Search Engine for SBK

**Summary:**

This project will yield a software tool that can improve the use of existing and emerging genomics databases by allowing users to search based on semantic concepts as opposed to purely syntactic keywords.

**TOPIC: SMART FACILITIES AND GREEN NETWORKS**

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**Company:**

Luna Innovations Incorporated  
1 Riverside Circle  
Suite 400  
Roanoke, VA 24016-4962

**Title:**

Standardized Energy Measurement Interfaces, Integration with Facility Infrastructure, and Energy-Aware Algorithms for High Performance Computing Systems

**Summary:**

This project will develop an intelligent sensor system that will allow for a significant increase in energy efficiency and productivity of high performance computing systems through the use of integrated sensing elements, active feedback systems for environmental controls, and embedded energy aware algorithms to maximize system resource effectiveness.

---

**Company:**

PC Krause and Associates, Inc.  
3000 Kent Avenue, Suite C1-100  
West Lafayette, IN 47906-1075

**Title:**

Performance and Energy Management in High Performance Computing Systems Using Application-Level Behavioral Attribute Driven Techniques

**Summary:**

This project will enable High Performance Computing (HPC) Systems to operate more consistently and with lower energy requirements.

---

**STTR Project**

**Company:**

RNET Technologies, Inc.  
240 West Elmwood Drive, Suite 2010  
Dayton, OH 45459-4248

**Title:**  
HPC Application Profiling for Energy Optimization

**Summary:**  
The operating (energy) costs of current and future supercomputers are approaching the procurement costs of these expensive machines. One approach to reducing the energy consumption of supercomputers is to give application developers transparent insight into the application's power requirements. This allows application developers to make the necessary power/performance tradeoffs.

## TOPIC: CLOUD COMPUTING

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**Company:**  
Agiliron, Inc.  
10940 SW Barnes Rd Ste 217  
Portland, OR 97225-5368

**Title:**  
Scalable Cloud Based Application Testing Service

**Summary:**  
Cloud Computing is rapidly growing in commercial use and also offers an attractive deployment infrastructure for scientific applications and government services. The development of the proposed quality management framework will facilitate the adoption and reliability of these new services.

**Company:**  
Parabon Computation, Inc.  
11260 Roger Bacon Drive, Suite 406  
Reston, VA 20190-5203

**Title:**  
Virtual HPC Cluster Provisioning in the Cloud

**Summary:**  
This project will remedy three fundamental software deficiencies in current "cloud computing" environments that otherwise limit their ability to serve the high-performance computing (HPC) community. As a result, users will be able to provision and use virtual clusters "in the cloud" in a convenient, affordable, pay-as-you-go fashion.

## TOPIC: DATA MANAGEMENT AND STORAGE

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### STTR Project

**Company:**  
RNET Technologies, Inc.  
240 West Elmwood Drive, Suite 2010  
Dayton, OH 45459-4248

**Title:**  
Green Storage for HPC with Solid State Disk (SSD) Technologies

**Summary:**  
This project will develop techniques must be developed to account for these profiles before SSDs can replace HDDs. Solid State Disks (SSDs) are the next generation storage hardware, to replace hard drives. SSDs have lower energy requirements coupled with the potential for better performance.

## TOPIC: MODELING AND SIMULATION OF INDUSTRIALLY-RELEVANT PROBLEMS

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**Company:**  
Combustion Research and Flow Technology, Inc.  
6210 Kellers Church Road  
Pipersville, PA 18947-2010

**Title:**  
Innovative Subgrid-Scale Combustion Modeling for Gas Turbines

**Summary:**  
This project will develop an advanced turbulent combustion model to support the development of new fuel-flexible gas turbine technologies. The model will include the physics required to accurately predict gas turbine operations and be efficient enough for engineering design analysis.

### STTR Project

**Company:**  
Continuum Dynamics, Inc.  
34 Lexington Avenue  
Ewing, NJ 08618-2302

**Title:**  
Advanced Methods for Predicting 3D Unsteady Flows Around Wind Turbines

**Summary:**  
This project will develop an entirely new class of multidisciplinary analysis software for predicting the aerodynamics,

fatigue, vibration and noise of wind turbines. By improving the ability to design and predict the lift of wind turbines, this new software will help to increase the reliability and life span of wind turbines, reduce maintenance costs while minimizing our dependency on foreign energy supplies and reducing greenhouse gas and carbon emissions.

---

**Company:**

Geological Storage Consultants, LLC  
14394 Embassy Way  
Apple Valley, MN 55124-6468

**Title:**

Commercialization and Application of Robust and Efficient Analysis Tools for Geological Sequestration of CO2

**Summary:**

An innovative simulation and modeling tool is being developed that will provide comprehensive risk assessment for geological CO2 storage projects. This software framework will provide injection site planners, government regulators, and insurance companies with the information to safely and economically store captured carbon dioxide.

---

**Company:**

IllinoisRocstar LLC  
60 Hazelwood Drive  
P.O. Box 3001  
Champaign, IL 61826-3001

**Title:**

Turbine Trailing Edge Noise Reduction Using Adjoint-Based Shape Optimization

**Summary:**

This project will develop high-fidelity simulation software to understand and minimize the noise radiated by the turbine blade trailing edge, enabling large wind turbine installations in more heavily populated areas, reducing design cycle time and lowering cost.

---

**Company:**

UltraHiNet LLC  
709 SW 80th Blvd  
Gainesville, FL 32607-6523

**Title:**

Computational Particle Dynamic Simulations on Multicore Processors (CPDMu)

**Summary:**

This project will scale the applications that employ simulation and analysis applications that need to be implemented on high-performance computers to petascale computers that are clusters of multicore processors, so as to obtain the performance promise of petascale computing.

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**TOPIC: CYBER-SECURITY AND NETWORKING**

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**Company:**

Acadia Optronics, LLC  
1395 Piccard Drive, Suite 210  
Rockville, MD 20850-4348

**Title:**

100 Gb/s Pattern Generator and Comparator

**Summary:**

This project will develop a 100 Gb/s pattern generator and comparator module that will enable testing of high-speed physical links.

---

**Company:**

Aries Design Automation, LLC  
6157 N. Sheridan Road, Suite 16M  
Chicago, IL 60660-5818

**Title:**

Exploiting GPUs for Scalable Network Intrusion Detection

**Summary:**

This project will result in a highly efficient Network Intrusion Detection System that utilizes the hundreds of cores on modern Graphics Processing Units to achieve very high processing speeds at a very low cost. Besides the DoE, the resulting technology will be of benefit to the DoD, all branches of the government, and all companies.

---

**Company:**

Dimension Technologies, Inc.  
315 Mount Read Boulevard  
Rochester, NY 14611-1982

**Title:**

Autostereoscopic Projection Display for Collaborative Applications

**Summary:**

This project will investigate and model a desktop display that can produce high resolution 3D images which can be viewed without 3D glasses by groups of scientists viewing complex multi dimensional data sets or simulations. These displays could also be used in conference rooms and eventually in home theater systems.

---



**Company:**

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

**Title:**

Implementation of an Energy-Saving Bro-Aware Load Balancer at 100 Gbps with Closed-Loop Flow Policy Control

**Summary:**

This project will develop Network Intrusion Detection Systems (NIDS) that will serve an indispensable role in preserving the integrity of computer networks. This project will design and implement a high-performance energy-saving load balancer that can distribute traffic at line rates of 100 Gbps.

---

**Company:**

cPacket Networks Inc.  
2061 Landings Drive  
Mountain View, CA 94043-0827

**Title:**

Cybersecurity and Networking: NIDS Front-End for Load Balancing at 100 Gigabits

**Summary:**

This project will explore conceptual design and implementation of 100 Gbps front-end-load-balancing for effective Network Intrusion Detection System (NIDS) clusters for mission critical networks. The goal is closing the technology gap between CPUs computing power to the demands of cyber security at high speed networks.

**TOPIC: HIGH PERFORMANCE COMPUTING SYSTEMS**

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**Company:**

Accelogic LLC  
1830 Main Street, Suite 204  
Weston, FL 33326-3684

**Title:**

Maximal-Performance Scalable FFT Library for Accelerator-Enhanced Petascale Computing

**Summary:**

This project will develop a breakthrough, low-cost technology that reduces computational times from months to hours to seconds, thus revolutionizing entire industrial design cycles and the way science, in general, is performed.

---

**Company:**

Galois, Inc.  
421 SW Sixth Avenue, Suite 300  
Portland, OR 97204-1629

**Title:**

Improved Symbol Resolution for Portable Build Systems

**Summary:**

This project will increase the productivity of software developers by describing a process and developing tools that make it easier to create and deploy portable software components in the context of High Performance Computing.

---

**Company:**

Galois, Inc.  
421 SW Sixth Avenue, Suite 300  
Portland, OR 97204-1629

**Title:**

A Deployable, Robust File System for Parallel I/O

**Summary:**

This project will decrease the cost and increase the productivity of massive data storage systems. Users include the high-performance computer industry who rely on fast, reliable computers. It also supports commercial users and providers of massive storage, including providers of massive databases or grid-based storage solutions.

---

**Company:**

ParaTools, Inc  
2836 Kincaid Street  
Eugene, OR 97405-4156

**Title:**

Packaging Portable HPC Tools for Linux

**Summary:**

This project will increase productivity of HPC developers, adds workers to produce LiveDVD/LiveUSB HPC Linux, delivers higher quality software production on platforms ranging from desktops to exascale leadership machines. HPC Linux targets modern multicore technology and ensures quality. construction of HPC software products.

---

**Company:**

ParaTools, Inc  
2836 Kincaid Street  
Eugene, OR 97405-4156

**Title:**

Increasing Build IQ: Integration Quality Tools for Build

**Summary:**

This project will produce IQB, a tool enabling faster, higher quality software production on platforms ranging from desktops to exascale leadership machines. IQB will leverage modern multicore performance to ensure consistent construction of large software products where all the pieces must work together to produce reliable scientific results.

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Accelerating PETSc through Next-Generation Heterogeneous Supercomputing

**Summary:**

This project will develop a next-generation super-computing facility for scientific computation. Successful completion of this project will ensure that these resources can be used by the most general scientific audience.

**TOPIC: COLLABORATION, SCIENTIFIC VISUALIZATION AND DATA UNDERSTANDING**

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**Company:**

Accelerated Data Works, Inc.  
2831-A NW 41st Street  
Gainesville, FL 32606-6690

**Title:**

Energy Tracking Software Platform

**Summary:**

This project will create an interactive energy tracking and visualization platform that supports decreasing electric, water, and gas usage. Homeowners will be able to track their improvement as they make home efficiency upgrades and compete within social groups to lower utility bills while reducing their environmental footprint.

**Company:**

Kitware, Inc.  
28 Corporate Drive  
Clifton Park, NY 12065-8688

**Title:**

Web-Based Scientific Collaboratory for Large Data Analysis

**Summary:**

This project will develop advanced software tools for the visual analysis of large and complex data across collaborating scientific communities. These tools will enable users to better understand and extract important information from data.

**Company:**

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

**Title:**

Large-Format Autostereo Volume Integrating Synthetic Holographic 3D Visualization System

**Summary:**

This project will develop advanced scientific visualization systems, a multiuser viewable wall-size 3D display system for collaborative data analysis and visualization of scientific data produced by computer simulations and experiments.

**TOPIC: NUCLEAR PHYSICS ELECTRONICS DESIGN AND FABRICATION**

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**Company:**

Advanced Science and Novel Technology Company  
27 Via Porto Grande  
Rancho Palos Verdes, CA 90275-7848

**Title:**

Readout SerDes System for Number-Mode Photon Counting Arrays Operating at 4K

**Summary:**

This project will develop an advanced multi-chip readout system with a proprietary low-complexity serial interface for a pixilated Visible Light Photon Counter sensor with a significantly higher efficiency than a photomultiplier tube. Technical and economic benefits of this project will occur in many scientific and commercial domains including nuclear and high energy physics, military and commercial imaging systems, etc.

**Company:**

American Semiconductor, Inc.  
3100 S. Vista Avenue, Suite 230  
Boise, ID 83705-7368

**Title:**

Next-Generation Detector and Imager Development

**Summary:**

This proposal will utilize the demonstrated detector diodes along with conversion of the readout design to MIGFET transistors and build the MAMBO in Flexfet SOI-CMOS to eliminate the threshold shift plaguing current SOI based

sensors. This project's success will result in the demonstration of an advanced X-ray Imager that has detector diodes formed in the handle silicon and a 12-bit counter array for high dynamic range X-ray or electron microscope imaging in the SOI layer with immunity to application of large backside biases.

---

**Company:**

HYPRES, Inc.  
175 Clearbrook Rd. #141  
Elmsford, NY 10523-1109

**Title:**

Low-Power Radiation-Hard ADC for Detector Readout

**Summary:**

A new low-energy digital logic is proposed for efficient readout of sensitive detectors. The benefits cover a wide spectrum ranging from identification of concealed weaponry to understanding of physics governing the universe.

---

**STTR Project**

**Company:**

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

**Title:**

Multi-Channel Electronics for Solid-State Photodetectors

**Summary:**

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

---

**Company:**

SVT Associates, Inc.  
7620 Executive Drive  
Eden Prairie, MN 55344-3677

**Title:**

Ultra-thin AlN/GaN Heterostructures for Robust, Radiation-hard Electronics

**Summary:**

This project will result in transistor (HEMT) devices which can reliably function for example under constant radiation in low earth orbits for more than 10 years with less than 30% drop in performance. Additionally, these devices can be integrated with GaN-based detectors for very high luminosity collider experiments.

---

**Company:**

Voxtel, Inc.  
12725 SW Millikan Way, Suite 230  
Beaverton, OR 97005-1782

**Title:**

Development of Commercial Foundry Source for Science-Grade Charged Particle Imagers

**Summary:**

This project will result in transistor (HEMT) devices which can reliably function for example under constant radiation in low earth orbits for more than 10 years with less than 30% drop in performance. Additionally, these devices can be integrated with GaN-based detectors for very high luminosity collider experiments.

**TOPIC:**

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**Company:**

TOPIC: NUCLEAR PHYSICS ACCELERATOR TECHNOLOGY Alameda Applied Sciences Corporation  
3077 Teagarden St  
San Leandro, CA 94577-5720

**Title:**

Films of Mo3Re to Improve the Performance of Existing Superconducting Radiofrequency Accelerator Cavities

**Summary:**

This project will develop the next generation of superconducting radiofrequency accelerator cavities. The long term goal is to produce a cavity that is economically viable in difficult economic times while advancing the goals of DOE's nuclear physics program.

---

**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Title:**

Integration of Heat Transfer and Particle Trajectory Simulation

**Summary:**

This project will develop a single software package to analyze high energy electron beams and obtain detailed thermal characteristics for a wide variety of applications. It will provide a user friendly graphical user interface and will greatly simplify the design process, produce more accurate results, and reduce costs and development time.

---

**Company:**

Diversified Technologies, Inc  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Fast Beam Switching Kicker for Electron Beam Cooling

**Summary:**

This project will develop microwave pulse compression technology. Once demonstrated, this technology will allow the electron-ion collider to be constructed. Both the compression and pulse technologies have applications to defense and industry in areas where high peak and average microwave power are needed simultaneously.

---

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Ct  
Building 15 Suite 155  
San Diego, CA 92121-1122

**Title:**

Quasi-3D Model of an Electron Cyclotron Resonance Ion Source

**Summary:**

This project will develop a sophisticated, numerical modeling tool that will decrease the cost of building and operating sources of highly charged ions that are used in nuclear physics research as well as industrial applications.

---

**Company:**

Faraday Technology, Inc.  
315 Huls Drive  
Clayton, OH 45315-8983

**Title:**

Electropolishing Niobium in an HF-Free Electrolyte

**Summary:**

This project will develop an environmentally benign fabrication process for superconducting components for the International Linear Collider. This program will eliminate the use of hydrofluoric acid, improving worker safety, while maintaining or exceeding current performance specifications.

---

**Company:**

InnoSense LLC  
2531 W. 237th Street, Suite 127  
Torrance, CA 90505-5245

**Title:**

Carbon Aerogels - Hot Catchers for Exotic Isotopes and/or Molecular Species

**Summary:**

This project will develop and demonstrate refractory carbon aerogels as catchers for the efficient production of rare isotopes of single-species molecular vapors. This project will support the DOE-FRIB Program objectives to promote understanding how stars explode or how elements from iron to uranium are created.

---

**Company:**

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

**Title:**

Novel Crab Cavity RF Design

**Summary:**

A room-temperature model of a cost-effective crab cavity module will be designed, built, and tested at low power. Radio frequency crab cavities are useful for particle colliders.

---

**STTR Project**

**Company:**

Niowave, Inc.  
012 North Walnut Street  
Lansing, MI 48906-5061

**Title:**

Development of an SRF Crab Crossing Cavity for an Electron Ion Collider

**Summary:**

This project will develop a superconducting spoke cavity that will have immediate use in existing nuclear physics research facilities.

---

**Company:**

Saxet Surface Science  
3913 Todd Lane, Suite 303  
Austin, TX 78744-1057

**Title:**

STRAW A Hydrogen-Specific Pressure Gauge for XHV

**Summary:**

Many of the next generation of physics accelerators will require high average electron currents, a potential issue for electron sources. This project will develop a pressure measurement device that allows routine use of better vacuum to protect these electron sources from ion damage.

---

**Company:**

Scientific Solutions, Inc.  
11619 Chippenham Way  
San Diego, CA 92128-4281

**Title:**

Miniature Electron-Cyclotron Resonance (ECR) Ion Source for Industrial Applications and Research

**Summary:**

The purpose of this project is to develop a miniaturized electron-cyclotron resonance (ECR) ion source. The smaller size and reduced complexity is an enabling technology for portable accelerators used for border security and detection of explosives and special nuclear materials.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Modeling and Optimization of Electron Emission from Diamond Amplifiers

**Summary:**

Novel high-current, high-brightness, low emittance electron sources are required for major up-grades of existing particle accelerators in order to further advance the field of experimental nuclear physics. High-fidelity software is being developed to enable new capabilities to design advanced, diamond-amplified, electron sources.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

GPU Acceleration of Spin Tracking in Colliding Beam Accelerators

**Summary:**

Fundamental advances in experimental nuclear physics will require cost-efficient acceleration of intense polarized particle beams. Well-tested software is being enhanced to enable quantitative simulation and design of these next-generation particle accelerators.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Self-consistent Numerical Design and Modeling of Radio Frequency Power

**Summary:**

The success of DOE-funded next generation accelerator facility depends on accurate prototype and test of RF power source. This project will develop numerical models and diagnostics to improve the effectiveness of RF power source design and analysis.

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

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**Company:**

Agiltron, Inc.  
15 Cabot Road  
Woburn, MA 01801-1003

**Title:**

Micromegas Particle Detector

**Summary:**

This proposed innovation for assembling micromegas particle detectors should reduce costs and reduce time to get results in basic physics experiments trying to answer the question – how is the universe put together?

---

**Company:**

Aspen Aerogels, Inc.  
30 Forbes Road, Bldg B  
Northborough, MA 01532-2501

**Title:**

Manufacturing of Large and Highly Transparent Aerogel Tiles with Refraction Indices up to 1.1 for Cherenkov Detectors

**Summary:**

This project will optimize the process to manufacture large aerogel monoliths with high optical clarity for use in Cherenkov radiation detectors. The optimized material will provide the high-energy physics community with an improved particle detection medium and will allow US laboratories to procure the aerogels from a U.S. manufacturer

rather than foreign suppliers. The advances made in manufacturing highly transparent aerogels can be broadly commercialized in the Building and Construction market. It will increase the energy efficiency of windows and building fenestrations.

---

**Company:**

PHDs Co. 777  
E mory Valley Road  
Suite B  
Oak Ridge, TN 37830-7048

**Title:**

Growth of Large Diameter High-Purity Germanium Crystals for Nuclear Physics Research

**Summary:**

There is a fundamental need for more sensitive, reliable, and cost effective instruments for the detection of gamma rays in Nuclear Physics experiments. The large diameter germanium crystals to be developed will provide the basis for these instruments.

---

**Company:**

Physical Sciences Inc.  
20 New England Business Center  
Andover, MA 01810-1077

**Title:**

Cryogenic Visible Light Photon Counting Array for the Neutron Electric Dipole Moment Experiment

**Summary:**

A collaboration of multiple academic institutions and DOE laboratories is working to measure the neutron electric dipole moment, thereby testing the basic physics of the universe. This project will develop a cryogenic Visible Light Photon Counting array to support this effort.

---

**STTR Project**

**Company:**

Sinmat Inc.  
2153 SE Hawthorne Road, Ste 124 (Box 2  
)Gainesville, FL 32641-7553

**Title:**

Defect Free, Ultra-Rapid Thinning/Polishing of Diamond Crystal Radiator Targets (20m) or Highly Linearly Polarized Photon Beams

**Summary:**

This project will develop a novel technology to produce special diamond crystals that can be used in nuclear reactors, and next generation computer devices.

**TOPIC:**

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**Company:**

TOPIC: NUCLEAR PHYSICS ISOTOPE SCIENCE AND TECHNOLOGY  
Manhattan Isotope Technology LLC  
228 Maple Drive  
Los Alamos, NM 87544--157

**Title:**

A New Evaluation of Recycling of the Cardiac Imaging Agent, Strontium-82, from spent Strontium-82/Rubidium-82 Generators

**Summary:**

There is currently a shortage of medical radioisotopes in North America. This project will allow the supply of the active pharmaceutical ingredient strontium-82. Strontium-82, is used for diagnosis of cardiac maladies such as coronary artery disease.

**TOPIC:**

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**Company:**

TOPIC: SITE REMEDIATION AND DEACTIVATION & DECOMMISSIONING IN THE DOE COMPLEX  
Applied Spectra, Inc.  
46661 Fremont Blvd  
Fremont, CA 94538-6410

**Title:**

In Situ Monitoring of Toxic Metals and Chlorinated Solvent Plumes using a Portable, Dual Sensor LIBS/Raman Device

**Summary:**

This project will develop an instrument that is an environmentally-friendly laser device used to quickly detect the presence of radionuclides and other contaminants in the environment which will allow public officials the ability to make informed decisions about public health issues.

---

**Company:**

Los Gatos Research  
67 East Evelyn Avenue, Suite 3  
Mountain View, CA 94041-1529

**Title:**

Lab-on-a-chip Technology for in-situ Mercury Speciation Characterization

**Summary:**

New technologies are urgently needed for long-term and continuous monitoring of contaminants in the subsurface environment. This project will develop a novel technology that provides the required sensitivity and selectivity, thus provides just such a means to accomplish this goal.

**Company:**

Mainstream Engineering Corporation  
200 Yellow Place  
Rockledge, FL 32955-5327

**Title:**

Development of an Active, Man-Portable, Cooling System with Dehumidification Capabilities for Personal Protective Clothing/Equipment

**Summary:**

This project will develop an active cooling system that can provide a cool/dry environment to workers in enclosed personal protective clothing/equipment. The technology will be lightweight, the size of a small backpack, and will improve working conditions so that heat stress is no longer a cause of concern.

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

NanoScale Corporation  
1310 Research Park Drive  
Manhattan, KS 66502-5000

**Title:**

Protective Apparel Fabrics (PAF) with Distinctly Area-Specific Waterproof and Breathable Properties

**Summary:**

This project will design protective apparel with area-specific waterproof and breathable properties in order to increase comfort and improve protection for users performing D&D work on surplus DOE nuclear facilities.

**Company:**

NanoSonic, Inc.  
1485 South Main Street  
Blacksburg, VA 24060-5556

**Title:**

Lightweight, Radiation- and Water-Proof, High-Performance Textiles

**Summary:**

This project develop a new technology allowing to reduce the weight of radiation-protective garments while enhancing their waterproof properties by taking advantage of its nanoscale techniques and high-performance materials. From this will result a lead-free product that may later be seen in hospitals, doctors' and dentists' offices.

**TOPIC: REMOTE SENSING**

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**Company:**

Physics, Materials, and Applied Mathematics Research, LLC  
1665 E. 18th Street, Suite 112  
Tucson, AZ 85719-6808

**Title:**

Development of Filament-Based Laser-Induced Breakdown Spectroscopy for the Standoff Detection of Radiological Materials

**Summary:**

This project will develop a robust, versatile and highly sensitive sensor capable of detecting nuclear and other sensitive materials at long range. This sensor can be used to increase national security and reduce risk to military personnel deployed on site.

**Company:**

Voxel, Inc.  
12725 SW Millikan Way, Suite 230  
Beaverton, OR 97005-1782

**Title:**

SOI CMOS Wafer Scale Imager Platform

**Summary:**

This project will develop a large area, low level imaging technology for persistent surveillance. The imager has higher resolution and sensitivity than commercial CMOS imaging products.

**TOPIC: RADIATION DETECTION**

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**Company:**

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

**Title:**

Novel Polycrystalline Scintillators for Nuclear Non-Proliferation

**Summary:**

This project will investigate promising nuclear detector designs that will have major impact in nuclear non-proliferation, medical imaging, scientific studies as well as commercial applications.

---

**Company:**

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

**Title:**

Non-Cubic Ceramic Scintillators for Nuclear Non-Proliferation

**Summary:**

This project will investigate promising nuclear detector designs that will have major impact in nuclear non-proliferation, medical imaging, scientific studies as well as commercial applications.

---

**Company:**

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

**Title:**

Growth of Semiconductors for Room Temperature Gamma-Ray Detection

**Summary:**

This project will develop high performance gamma-ray detectors that operate at room temperature are critical to many applications including detection and identification of special nuclear materials.

---

**Company:**

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

**Title:**

Novel Concepts for Handheld Radioisotope Identifiers

**Summary:**

This project will investigate promising nuclear detector designs that will have major impact in nuclear non-proliferation, medical imaging, scientific studies as well as commercial applications.

**TOPIC: SIMULATION AND SOFTWARE TOOLS FOR NONPROLIFERATION R&D**

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**Company:**

Kitware, Inc.  
28 Corporate Drive  
Clifton Park, NY 12065-8688

**Title:**

A Scalable Visual System For Proliferation Analysis

**Summary:**

This project's work addresses the need for further advancements in tools which effectively combine nuclear proliferation data so information is automatically connected, allowing intuitive navigation, visualization, and collaboration with a scalable, web-based application.

---

**Company:**

The Aptec Group, LLC  
22 Proctor Hill Road  
Hollis, NH 03049-6428

**Title:**

Development of an Ontology-Directed Signal Processing Toolbox

**Summary:**

This project is focused on the development of tools for the automatic configuration of signal processing systems. The goal is to develop tools that will be useful in a variety of Government and commercial areas and useable by people who are not signal processing experts.

**TOPIC: RESEARCH TO SUPPORT NUCLEAR EXPLOSION MONITORING**

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**Company:**

Rocky Mountain Geophysics, Inc.  
167 Piedra Loop  
Los Alamos, NM 87544-3836

**Title:**

Development of Mine Explosion Ground Truth Smart Sensors

**Summary:**

This project will develop a seismo/acoustic smart sensor system to be used to transmit accurate ground truth information (location, origin time, magnitude) from mining regions to improve U.S. nuclear explosion monitoring capabilities. The system will be compact, inexpensive, simple to deploy and capable of autonomous operation for periods of up to six months.

---

**Company:**



XIA, LLC  
31057 Genstar Road  
Hayward, CA 94544-7831

**Title:**

Silicon Drift Detectors for High Resolution Radioxenon Measurements

**Summary:**

This project will develop a more sensitive, easier to use method to detect this xenon, the instrument will support and improve national and international efforts to detect, confirm, and deter tests of nuclear weapons.

**TOPIC: ADVANCED TECHNOLOGY FOR NUCLEAR ENERGY**

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**Company:**

Analysis and Measurement Services Corporation  
9111 Cross Park Drive, Bldg A  
Knoxville, TN 37923-4510

**Title:**

Integrated System for Management of Cable Aging in Support of Long Life Operation of Nuclear Power Plants

**Summary:**

The resurgence of nuclear energy as an environmentally friendly source of electrical power has encouraged US nuclear power plants to renew their licenses to operate for 60 years or beyond. As such, they are faced with the growing need to effectively manage their aging assets. One of the greatest challenges will be the determination of the condition of aging cables. This proposal is designed to conduct a hands-on R&D effort for the development of a state-of-the-art cable condition monitoring system not currently available in the nuclear power industry.

**Company:**

Analysis and Measurement Services Corporation  
9111 Cross Park Drive, Bldg A  
Knoxville, TN 37923-4510

**Title:**

Prognostic Methods for Predicting Remaining Useful Life of Nuclear Plant Equipment and Components

**Summary:**

This proposal offers to provide a prognostic system that can provide predictions of the remaining useful life or time to failure of critical plant equipment and components. Successful implementation of prognostic technologies in nuclear power plants can potentially reduce reactor trips and refueling outage times.

**Company:**

Ceramic Tubular Products, LLC  
15815 Crabbs Branch Way  
Rockville, MD 20855-6636

**Title:**

Silicon Carbide Clad Thoria Plutonia Fuel for Light Water Reactors

**Summary:**

The new fuel and clad technology developed in this project will reduce the volume of nuclear waste from nuclear power plants, increase the overall safety, and enable plant life extension from 60 to 80 years. It will also allow for more complete destruction of fissile plutonium in spent fuel.

**STTR Project**

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Ct Building 15 Suite 155  
San Diego, CA 92121-1122

**Title:**

Diagnostic for Rapid Characterization of TRISO Fuel Pellets Using Soft X-Rays

**Summary:**

This project will develop an apparatus that uses X-rays to perform rapid quality control and quality assurance testing on fuel for the next generation of nuclear reactors. This technology would enable all of the fuel going into a reactor core to be inspected, rather than just a random sample.

**Company:**

Lambda Instruments, Inc.  
840 University City Blvd., Ste 4  
Blacksburg, VA 24060-2708

**Title:**

Accident Condition Temperature Monitoring up to 1600°C in Gen-IV Reactors using Sapphire Fiber Optic Sensors

**Summary:**

Nuclear energy is widely held as being the only viable source of abundant, CO<sub>2</sub> emissions-free electrical energy capable of meeting projected needs in the near term. This project will develop a sensor technology which will enable the safe operation of emerging nuclear reactor designs.

**Company:**

Radiation Monitoring Devices, Inc.  
44 Hunt Street

Watertown, MA 02472-4699

**Title:**

Solid-State Sensor to Directly Replace Coils for Improved Eddy Current Testing (ECT)

**Summary:**

This project will develop new, high sensitivity, solid-state sensors for rapid, high performance inspection of power plants, bridges, and transportation vehicles.

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

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**Company:**

David Wojick  
391 Flickertail Lane  
Star Tannery, VA 22654-1908

**Title:**

X-Portal Technology for Scientific Discovery

**Summary:**

This project will develop the technology to build comprehensive Web portals for the scientific community.

**Company:**

Deep Web Technologies, LLC  
301 North Guadalupe, Ste 201  
Santa Fe, NM 87501-5501

**Title:**

Automating Scalability of Federated Search in a Cloud Computing Environment

**Summary:**

This project will demonstrate that cloud computing, a technology promoted by the Obama administration, is well suited for enhancing today's scientific search technology. Enhancements include enabling more efficient and effective research and widening the research net to include foreign language content translated to the researcher's native language.

**Company:**

Edgewater Federal Solutions FKA  
Edgewater Technology Assoc.  
3528 Worthington Blvd. Suite 301  
Urbana, MD 21704-7014

**Title:**

Search, Discovery, and Communication of Scientific and Technical Knowledge in Distributed System

**Summary:**

This project will develop innovative methods for the automatic generation of knowledge bases for the improved searching and exploration of scientific and technical databases.

**Company:**

Information International Associates, Inc.  
1055 Commerce Park Drive, Ste 110  
Oak Ridge, TN 37830-4219

**Title:**

Deep Indexing of Complex Scientific and Technical Information Documents

**Summary:**

This project will explore the need for researchers locate digital objects such as graphs, charts and tables within scientific and technical information (STI) research documents and suggest a methodology for the Department of Energy to implement that capability for their massive STI holdings.

**Company:**

Information International Associates, Inc.  
1055 Commerce Park Drive, Ste 110  
Oak Ridge, TN 37830-4219

**Title:**

Mobile Device Applications in the Digital Library

**Summary:**

This project will explore the need for researchers and scientists to access digital library services on mobile devices and to provide access to scientific and technical information (STI) research documents on such devices.

**TOPIC: ADVANCED DIAGNOSTIC TECHNIQUES FOR ELECTRICITY SYSTEMS**

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**Company:**

FieldMetrics Inc.  
13352 82nd Avenue  
Seminole, FL 33776-3126

**Title:**

Smart Grid Sag and Temperature Monitor for Overhead Power Lines

**Summary:**

This project will develop a new, low cost conductor sag and temperature sensors retrofitted to existing transmission

infrastructure will improve system reliability, increase the carrying capacity of the current power grid, and reduce costs associated with connecting renewable energy sources to the grid.

---

**Company:**

Intelligent Fiber Optic Systems Corporation  
2363 Calle Del Mundo  
Santa Clara, CA 95054-1008

**Title:**

Highly Multiplexed, Low Cost Fiber-Optic Sensor Array for Underground Cables Condition Monitoring

**Summary:**

A changing supply mix in the U.S. power grid, expanding power quality needs, and continuing demand growth are stressing an aging, congested electricity infrastructure, and thus challenging system reliability. Condition monitoring technologies can optimize the utilization of transmission and distribution (T&D) assets and improve their operational efficiencies through a smart-grid-enabled infrastructure.

---

**Company:**

Signal Processing, Inc.  
13619 Valley Oak Circle  
Rockville, MD 20850-3563

**Title:**

A Fast Detection and Localization Approach to Monitoring Cables in Underground Power Distribution Network

**Summary:**

This project will develop a new fault detection and localization system that is low cost, non-intrusive, and can help early detection of arcing and short-circuit faults in underground power networks.

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**Company:**

Underground Systems, Inc.  
84 Business Park Drive, Ste 109  
Armonk, NY 10504

**Title:**

Underground Cable Advanced Diagnostics

**Summary:**

This project will investigate the design of an advanced diagnostic system that increases the reliability and utilization of the underground transmission system.

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**TOPIC: ADVANCED ENERGY STORAGE**

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**Company:**

Brayton Energy, LLC  
75B Lafayette Road  
Hampton, NH 03842-2624

**Title:**

Modular Undersea Compressed Air Energy Storage (UCAES) System

**Summary:**

A cost-effective solution for energy storage will make intermittent renewable energy sources, e.g., solar and wind, dependable. Undersea storage offers the possibility of containing compressed air under the weight of water allowing for light, inexpensive manufactured systems which can provide energy to the electrical grid on demand.

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**Company:**

Exquadrum, Inc.  
12130 Rancho Road  
Adelanto, CA 92301-2703

**Title:**

Ocean CAES (OCAES)

**Summary:**

This project will conduct a research and development program, entitled Ocean CAES (OCAES). This technology overcomes the challenges associated with storing energy generated by renewable sources by means of Compressed Air Energy Storage vessels stationed out of sight on the bottom of the ocean.

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**TOPIC: HIGH-SPEED ELECTRONIC INSTRUMENTATION FOR DATA ACQUISITION AND PROCESSING**

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**Company:**

Voxtel, Inc.  
12725 SW Millikan Way, Suite 230  
Beaverton, OR 97005-1782

**Title:**

Low Cost, Reconfigurable, Multi-Channel Pulse Processing Platform

**Summary:**

This project will develop a novel, low-cost method of achieving psec-scale time stamping and pulse processing of gamma-ray photons and charged particles is being developed.

## TOPIC: HIGH ENERGY PHYSIC COMPUTER TECHNOLOGY

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**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Integrating Scientific, Grid, and Cloud Computing Infrastructures

**Summary:**

The Grid Cloud Computing Service provides an effective alternative approach for utilizing our national computing infrastructures more efficiently by providing custom complex scientific application execution environments.

## TOPIC: HIGH ENERGY PHYSICS DETECTORS

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**Company:**

Arradiance, Inc.  
142 North Road, Suite F-150  
Sudbury, MA 01776-1142

**Title:**

Efficient Manufacture of Extreme Surface Area Microchannel Plate Devices Functionalized by Atomic Layer Deposition Thin Films

**Summary:**

Efficient manufacture of extreme surface area Microchannel plate devices functionalized by atomic layer deposition thin films is an essential component of next generation high energy physics detector designs as well as novel detection applications in medical discovery and diagnostics and homeland security applications.

**Company:**

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

**Title:**

High-Performance, CMOS Solid-State Photomultiplier

**Summary:**

This project will develop a high-performance photodetector for radiation detectors, such as PET and SPECT imagers and scientific instruments.

**Company:**

Vega Wave Systems  
1275 West Roosevelt Road, Suite 104  
West Chicago, IL 60185-4815

**Title:**

Compact, Low-Power, High Speed Fiber Optic Interconnects for Particle Physics Detectors

**Summary:**

This project will develop 3D integration of very high speed optical communications links for the next generation of high energy physics particle detectors. Spin-offs from this technology are expected to have significant commercial value by improving data transfer and network traffic for large computer network systems, including the internet.

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

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**Company:**

HJC Enterprise, LLC  
5 Badgley Drive  
New Providence, NJ 07974-2501

**Title:**

Reduction of Porosity for High Critical Current Density Bi-2212 Superconductor Wire

**Summary:**

High-field magnets are essential components of devices used in a number of advanced fields of science, such as NMR and ICR (widely used in drug discovery), magnetic fusion (searching for everlasting energy), and particle accelerators used in high energy physics. This study seeks to improve electric current carrying capability of Bi-2212 wire by reducing porosity in filament.

**Company:**

Metal Oxide Technologies, Inc.  
8807 Emmott Rd., Suite 100  
Houston, TX 77040-3533

**Title:**

Low Cost YBCO Superconductors for High Energy Particle Colliders

**Summary:**

A reliable, commercially viable superconducting wire which operates without electrical loss will benefit not only high energy physics fundamental research, but also: (1) Industry development and economic growth, (2) The environment

by reducing the consumption of politically unstable fossil fuel, (3) Government and military mission critical programs.

---

**STTR Project**

**Company:**

nGimat Co.  
5315 Peachtree Boulevard  
Atlanta, GA 30341-2107

**Title:**

Thin Robust Electrical Insulator High Field HTS Magnets

**Summary:**

This project addresses stability and high magnetic field enhanced thermal coating of high temperature superconductors. Thin, nanoceramic-based coatings will be applied to conductor strands for electrical resistance and to improve thermal conduction. The technology is proposed to help increase minimum quench energy while enhancing quench detection, thus improving superconducting efficiency.

---

**Company:**

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

**Title:**

High Strength Silver Sheath for Bi2212/Ag Conductor

**Summary:**

This project will develop material to advance the technology of high temperature, high field superconductors is necessary for maintaining U.S. leadership in the fields of materials science, biomaterials and high energy physics.

---

**Company:**

UES, Inc.  
4401 Dayton-Xenia Road  
Dayton, OH 45432-1894

**Title:**

Improved Current Feeders and Current Distribution System for Accelerator Magnets Using High-Temperature Superconductors

**Summary:**

This project will develop superconducting current leads based on high temperature superconductors for accelerator magnets and other potential applications with the benefit of lower losses and higher efficiency. Success of this project may lead to the development of new compact and lightweight power transmission devices for accelerators.

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

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**Company:**

Beam Power Technology, Inc.  
5 Rolling Green Lane  
Chelmsford, MA 01824-4469

**Title:**

Design of a Converging Elliptic Gun for Elliptic-Beam Klystron Applications

**Summary:**

This company will use its innovative patented technology to design converging elliptic electron guns used to produce lower cost, more energy efficient elliptic-beam klystrons for research and industry.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Title:**

Dielectric Collimators for Linear Collider Beam Delivery

**Summary:**

This project will develop a special device to control electron bunch of the future linear collider. The use of new software and materials that our company has developed is expected to lead to improved performance and efficiency.

---

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Ct  
Building 15 Suite 155  
San Diego, CA 92121-1122

**Title:**

High Sensitivity Beam Position Monitors for 1300 MHz Cryomodules

**Summary:**

This project will develop a beam profile monitor with high precision for the International Linear Collider. The International Linear Collider promises to provide new information on fundamental physics processes.

---

**Company:**

Hyper Tech Research, Inc.  
1275 Kinnear Road  
Columbus, OH 43212-1155

**Title:**

Short Period Model Helical Undulator for the ILC - Design and Demonstration

**Summary:**

This project will develop this so-called "undulator" is to be constructed from magnets wound with an advanced highly stable Nb<sub>3</sub>Sn strand to be developed as part of the proposed program.

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

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**Company:**

Calabazas Creek Research, Inc.  
690 Port Drive  
San Mateo, CA 94404-1010

**Title:**

High Current Density Long Life Cathodes for High Power RF Sources

**Summary:**

This project will develop extension of controlled porosity, reservoir cathodes that will allow development of higher power RF sources at reduced cost. This will decrease the cost of future accelerator and collider systems while providing higher performance.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Title:**

Development of a Dielectric-Based Short RF Pulse Two Beam Accelerator Prototype Module

**Summary:**

Ultra-high gradient and ultra-high power radio frequency (rf) generation are preferred for the future high energy collider design. Unlike the most of the present accelerator designs, which choose pulse lengths in the range of 150-400 ns and gradients ~100 MV/m as the operational parameters, we propose a short pulse (~20 ns), high repetition rate (>1 kHz), high gradient (>200 MV/m) accelerator as an alternative technology to meet the requirements for future high energy machines if the related technologies can be demonstrated.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Title:**

THz Dielectric Wakefield Accelerating Structure

**Summary:**

This project will develop a manufacturing technology of artificial diamond fiber to be used in dielectric loaded accelerating structures. When developed, this structure will sustain a record high accelerating gradient in THz frequency range. The results will be also applied to next-generation accelerators and high power THz systems as well as to medical equipment development.

---

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

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

**Title:**

Epicyclic Helical Channels for Parametric Resonance Ionization Cooling

**Summary:**

In order to maximize the discovery potential of elementary particle colliders at the energy frontier, or to create low-divergence neutrino beams, the momentum spread of particles in the beams must be reduced via 'cooling'. This project will develop a new approach to the design of the required beam cooling systems.

---

**Company:**

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

**Title:**

Fast Time-of-Flight System for Muon Cooling Experiments

**Summary:**

The latest developments in large-area fast timing devices are applied to a key area of high energy accelerator research, and can also be applied to medical imaging and homeland security systems.

---

## **STTR Project**

### **Company:**

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

### **Title:**

Simulation of Accelerator Based Backgrounds in a Muon Collider

### **Summary:**

This project will develop a program to compute the backgrounds from a muon beam that result from the decay of the muons in a muon collider. This program would be a significant asset for the design and development of the detector and the optimization of the accelerator-detector interface.

---

### **Company:**

Omega-P, Inc.  
258 Bradley St., 2nd fl.  
New Haven, CT 06510-1106

### **Title:**

High Current Cold Cathode Employing Diamond and Related Materials

### **Summary:**

Vacuum electronics devices used to power particle accelerators for discovery science and industrial applications, but also television transmitters and radar tubes, almost always employ thermionic cathodes, having limited current capability and requiring ancillary heating power. This project will develop cold cathodes that appear to offer higher current density, without need for heating power, thus improving device performance with lower operating cost.

---

### **Company:**

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

### **Title:**

Study of a Muon Collider Dipole Magnet System to Reduce Detector Background and Heating

### **Summary:**

High-temperature superconductor (HTS) magnet technology should improve the energy efficiency of future elementary particle accelerators and make them more tolerant of energy deposition. This project will conduct a feasibility study to develop an HTS open-midplane dipole magnet for a muon collider.

---

### **Company:**

PolarOnyx, Inc.  
470 Lakeside Drive, Suite F  
Sunnyvale, CA 94085-4720

### **Title:**

Compact 2 micron High Power Femtosecond Fiber Laser

### **Summary:**

This project will develop a femtosecond fiber laser system for next generation HEP accelerator application. It will enable high repetition rate, high quality, compact, and low cost high energy study.

---

### **Company:**

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

### **Title:**

Fiber Amplifiers for Laser-Based Accelerators

### **Summary:**

The next generation of particle accelerators needs a fundamentally new approach to be able to advance our understanding the fundamental building blocks of nature. This project will help make possible a promising technique based on laser-driven acceleration. Spin-offs may include compact and inexpensive X-ray sources for improved medical diagnostics.

---

### **Company:**

RadiaBeam Technologies LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

### **Title:**

Gated Field Emission Cathode RF Gun

### **Summary:**

This project will develop a new type of electron gun based on advances in nanotechnology. The gun would have applications in research, cancer therapy, cargo inspection, and industrial irradiation.

---

### **Company:**

RadiaBeam Technologies LLC  
1717 Stewart Street  
Santa Monica, CA 90404-4021

**Title:**

Periodic Structures for High Gradient Dielectric Wakefield Acceleration Experiments

**Summary:**

This project will design a novel acceleration scheme for charge particle bunches using a dielectric wakefield structure. Accessing frequency regimes out to terahertz, such a device will find numerous applications in the areas of medicine, industry, homeland security, and basic research.

---

**Company:**

STI Optronics, Inc.  
2755 Northup Way  
Bellevue, WA 98004-1495

**Title:**

Advanced Capillary Discharge for Laser Wakefield Acceleration

**Summary:**

This project will develop a new type of capillary discharge for advanced high-energy electron accelerators. Applications for these accelerators include industrial processing, medicine, homeland defense, and high-energy physics.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Rapid Low-Noise Simulation of Ultra-bright 10 GeV Electron Bunches in Laser Plasma Accelerators

**Summary:**

Future generation high-energy particle accelerators, used to study the fundamental nature of matter, will likely include plasma-based components. This project will enhance existing software to enable the accurate simulation and design of such devices.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Capillary Discharge Modeling to Improve High Gradient Advanced Accelerators

**Summary:**

This project will develop new, advanced plasma modeling tools to improve the accelerators that rely on capillary discharge plasma sources.

---

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

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**Company:**

Creare Incorporated  
16 Great Hollow Road  
P.O. Box 71  
Hanover, NH 03755-3116

**Title:**

A Robust High Speed Switch for Pulsed Power Applications

**Summary:**

Pulsed power applications for high energy physics research, manufacturing, radar, radio communications, and directed energy weapon systems require innovative power semiconductor devices. This project will provide improved cost, reliability, and efficiency for these systems over currently available devices.

---

**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Marx Modulator Optimization for Advanced Accelerators

**Summary:**

This project will work toward completing the design of an affordable, high voltage short pulse modulator applicable to a large number of U.S. and international accelerator programs.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Title:**

Development Of A 12 GHz Dielectric-Based Wakefield Power Extractor for Potential Clic Applications

**Summary:**

Dielectric based high power radio frequency (rf) generator offers the possibility of reduced cost and higher efficiency for



applications in the next generation high energy physics machine, as well as industry, medicine, and scientific research. This project will develop such a device to meet the particular requirements of the Compact Linear Collider, which is the high energy physics machine under design with joint effort of Europe and U.S.

---

**Company:**

Euclid TechLabs, LLC  
5900 Harper Rd. #102  
Solon, OH 44139-1866

**Title:**

Multipactor Suppression In Dielectric Loaded Accelerating Structures Using Vacuum Channel Surface Modification

**Summary:**

Dielectric based particle accelerators offer the possibility of reduced cost and higher efficiency for applications in industry, medicine, and scientific research. This project will study ways to eliminate a form of energy absorption that is currently the main obstruction to widespread use of these devices.

---

**Company:**

Haimson Research Corporation  
3350 Scott Boulevard, Bldg 60  
Santa Clara, CA 95054-3104

**Title:**

A 17 GHz High Gradient Linac having Molybdenum Surfaces in the Peak Electric Field, Dark Current Interception Regions of the Structure

**Summary:**

This project will develop a gradient hardened accelerating structure that will represent a significant advance in radio-frequency linear accelerator technology and will have a positive impact on the design of future linear collider systems as well as on the continuing miniaturization of commercial accelerators for medical, industrial radiographic and homeland security applications.

---

**Company:**

Lynntech, Inc.  
7610 Eastmark Drive  
College Station, TX 77840-4023

**Title:**

High Energy Density Capacitors for Pulsed Power Systems

**Summary:**

Capacitors that have improved energy density than the state-of-the-art capacitors are needed for pulsed power systems. This project will develop nanodielectrics materials that will have enhanced storage capabilities.

---

**STTR Project**

**Company:**

Niowave, Inc.  
012 North Walnut Street  
Lansing, MI 48906-5061

**Title:**

Development of an SRF Deflecting/Crabbing System for FermiLab's Project-X

**Summary:**

This project will develop a superconducting crabbing cavity that would have immediate use in existing nuclear physics research facilities.

---

**Company:**

Niowave, Inc.  
1012 North Walnut Street  
Lansing, MI 48906-5061

**Title:**

Development of Superconducting Photonic Band Gap Accelerating Cavities

**Summary:**

Photonic band gap particle accelerators use a novel design that eliminates power reflections which distort the particle beam. This project develops a superconducting version of this new type of cavity to make it usable in high-power accelerators.

---

**Company:**

Omega-P, Inc.  
258 Bradley St., 2nd fl.  
New Haven, CT 06510-1106

**Title:**

Modified Magnicon For High-Gradient Accelerator R&D

**Summary:**

This project will improve performance for the unique millimeter wave amplifier that is a key element in an R&D program towards developing a future high-gradient particle accelerator will broaden the scope of research that can be accomplished. This work could help position U.S. science to play a more dominant role in future large international research projects, and could introduce new technology for the U.S. microwave tube industry to make their products

more competitive.

---

**Company:**

Omega-P, Inc.  
258 Bradley St., 2nd fl.  
New Haven, CT 06510-1106

**Title:**

High-Gradient Two-Beam Electron Accelerator

**Summary:**

A high-energy electron-positron collider is believed by members of the scientific community to be one of the next "big science" projects requiring intellectual and financial support from governments on an international scale. Technical improvements in this project have the potential to reduce the cost and complexity of a future collider, thus making it more appealing to those responsible government bodies.

---

**Company:**

Shear Form, Inc.  
207 Dellwood St  
Bryan, TX 77801-2520

**Title:**

"Fine grain Nb tube for SRF Cavities"

**Summary:**

Increased deformability in high residual resistance ratio (RRR) Nb tube for superconducting radio frequency (SRF) cavities in linear accelerators will be achieved by an improved microstructure in the Nb. The improved microstructure will be produced by a new materials processing method to reduce the average grain size, improve microstructural uniformity, improve material ductility, and lower SRF cavity manufacturing costs.

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

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**Company:**

Composite Technology Development, Inc.  
2600 Campus Drive, Suite D  
Lafayette, CO 80026-3359

**Title:**

Insulation Materials and Processes for Helium Penetrations

**Summary:**

Materials and processes will be developed to provide electrical insulation for the helium penetrations and electrical terminations for magnets in the ITER fusion device. These areas of the system are non-uniform in shape, and specific processes must be developed to ensure the overall reliability of the system.

---

**Company:**

HyPerComp, Inc.  
2629 Townsgate Road, Suite 105  
Westlake Village, CA 91361-2981

**Title:**

Practical CAD-Centric Modeling of Transport Phenomena in Liquid Breeder Blankets

**Summary:**

This project will provide engineering estimates of the performance of the power producing elements of proposed fusion reactors. Calculations such as these will help determine and maximize their safety, efficiency and reliability using a relatively low budget.

---

**Company:**

Hyper Tech Research, Inc.  
1275 Kinnear Road  
Columbus, OH 43212-1155

**Title:**

High Temperature Superconducting (HTS) Cable for Fusion Systems

**Summary:**

This project will develop an advanced and lower cost superconductor wire for the DOE Fusion Energy Program.

---

**Company:**

Luna Innovations Incorporated  
1 Riverside Circle, Suite 400  
Roanoke, VA 24016-4962

**Title:**

Laser Vibrometer PFC Health Monitoring System

**Summary:**

An enabling technique for in-situ health monitoring of fusion reactor's plasma facing components is proposed to support current and future tokamak development (including ITER). This system enables safe operation of these reactors, which in turn reduce the US dependency on foreign oil while simultaneously reducing green house gas emission.

---

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

Supercon, Inc.  
2G 830 Boston Turnpike  
Shrewsbury, MA 01545-3386

**Title:**

Development of High Current High Temperature Superconductor Cabling Technology

**Summary:**

This project will demonstrate the feasibility of a new superconducting cable in order to attain the required high magnetic fields.

---

**Company:**

UES, Inc.  
4401 Dayton-Xenia Road  
Dayton, OH 45432-1894

**Title:**

Novel YBCO Coated Filaments for Superconducting Magnets

**Summary:**

A novel approach termed fiber coated conductor will bring very high engineering critical current density with extremely low AC loss. Fiber coated conductor will be ideal in making multifilament cable which will be the only viable technology for the next generation magnet, motors, transformers, and generators fabrication.

**TOPIC: FUSION SCIENCE AND TECHNOLOGY**

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**Company:**

Diversified Technologies, Inc.  
35 Wiggins Avenue  
Bedford, MA 01730-2314

**Title:**

Components for Heating and Fueling of Fusion Plasmas

**Summary:**

This will design a unique prototype solid-state power system for driving fusion reactors. The new design will reduce hardware costs by approximately 30% compared to currently available state-of-the-art systems.

---

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

Eagle Harbor Technologies, Inc.  
321 High School Rd. NE, Suite D3, #179  
Bainbridge Island, WA 98110-1619

**Title:**

Low-Impurity, Electrode-less Pre-ionizer Plasma Gun for Innovative Confinement Concepts

**Summary:**

The proposed work seeks to develop a high power plasma refueling gun to provide low impurity starter plasma for Innovative Confinement Concept for fusion energy development.

---

**Company:**

Enig Associates, Inc.  
4600 East West Hwy, Ste 500  
Bethesda, MD 20814-3491

**Title:**

ALEGRA-MHD Applications to Solid Liner MTF/MIF Confinement Concepts

**Summary:**

This project will provide insight into both versions of low gain magneo-inertial fusion. The use of high fidelity, high performance computing simulation will provide more flexibility in the ability to study a wide range of experimental configurations than can be done in the laboratory.

---

**Company:**

FAR-TECH, Inc.  
3550 General Atomics Ct Building 15 Suite 155  
San Diego, CA 92121-1122

**Title:**

Disruption Simulation Code for Tokamaks and ITER Applications

**Summary:**

This project will provide a breakthrough in the acquisition of scientific understanding needed to predict, avoid, and mitigate disruptions, which is arguably the most important issue in the successful development of tokamak-based magnetic fusion.

---

**Company:**

Nova Photonics, Inc.  
One Oak Place  
Princeton, NJ 08540-4701

**Title:**

A Water Hydraulic System for Shutter Actuation on ITER

**Summary:**

This project will develop a innovative shutter system which will protect the sensitive diagnostic systems on ITER from damage from the plasma. A successful demonstration of fusion power on ITER could bring us closer to achieving fusion energy as a clean, safe, and abundant energy source.

---

**Company:**

Plasma Processes, Inc  
4914 Moores Mill Road  
Huntsville, AL 35811-1558

**Title:**

Advanced ICRF Antennas for Fusion Energy Devices

**Summary:**

Advanced coating techniques will be developed enabling the fabrication of more reliable, higher performance components for fusion energy devices.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Extending BOUT++ for Solution of Edge Plasma Equations for Use in Whole Device Simulation of Tokamaks

**Summary:**

Robust and accurate computational methods will be developed for understanding results from international thermonuclear reactor, ITER.

---

**Company:**

Tech-X Corporation  
5621 Arapahoe Ave  
Boulder, CO 80303-1379

**Title:**

Gyrotron Design and Evaluation using New Particle-in-Cell Capability

**Summary:**

Gyrotrons provide power to heat the ITER fusion experiment, but suffer from a poorly understood oscillation phenomenon that: a) disturbs their monitoring diagnostics, and b) could limit performance of more advanced designs. A recent breakthrough in one area of electromagnetic modeling can provide exactly the tool needed to investigate this problem with a more advanced technique.

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**TOPIC: HIGH ENERGY DENSITY LABORATORY PLASMA (HEDLP)**

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**Company:**

NumerEx, LLC  
2309 Renard Place SE, Ste 220  
Albuquerque, NM 87106-4259

**Title:**

A Three-Dimensional Magnetohydrodynamic Simulation Capability for Liner Compression of Field Reversed Configurations

**Summary:**

This project will develop a three dimensional computer modeling capability to help guide an innovative experiment that will collapse an aluminum tube a little larger than two soda cans placed end to end on a hot, magnetized, gas in twenty millionths of second to attempt to create fusion in a laboratory.

---

**Company:**

Polymath Research Inc.  
827 Bonde Court  
Pleasanton, CA 94566-7505

**Title:**

Spike Trains of Uneven Duration and Delay Optimally Designed for HEDLP and IFE

**Summary:**

Spike Trains of Uneven Duration and Delay or a STUD pulse is a new concept in laser design for inertial fusion energy which will control the runaway growth of laser-plasma instabilities and may usher in the era of clean, Carbon emission free, and proliferation resistant, endless nuclear energy for the future of mankind.

---

**Company:**

Research Applications Corporation  
148 Piedra Loop  
Los Alamos, NM 87544-3837

**Title:**

ePLAS Development for Plasma Jet Modeling and Applications

**Summary:**

This project will apply, improve and disseminate a unique, tested computer simulation code, ePLAS, for plasma jet modeling, creating an optimal path toward the production of hot, dense plasmas for the mastery of controlled fusion

power for the nation.

---

**Company:**

Voss Scientific, LLC  
418 Washington Street SE  
Albuquerque, NM 87108-2811

**Title:**

Hybrid Modeling of Plasma Jet Transport, Merging and Liner Formation

**Summary:**

A high-fidelity computer model is being developed to support the fusion energy program. The simulation techniques will enable a rigorous study of an array of powerful plasma jets converging radially inward to compress a fusion target.

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