Vision OPEN 2024

Project Descriptions

AIR FORCE RESEARCH LABORATORY – Dayton, OH

Scaled Synthesis of Carbon Nanotubes via Autonomous Experimentation – $2,200,000

The Air Force Research Laboratory is developing a reactor to produce high quality carbon nanotubes at high production rates via combustion processes. This technology will increase productivity by 100 times greater than similar methods. These nanotubes can be used for future energy applications and zero-emission hydrogen production. The proposed technology will be applicable to batteries and light weight, high-performance composites.

ADDIS ENERGY – Somerville, MA

Stimulated Geologic Ammonia as a Primary Energy Resource – $4,500,000

Addis Energy is developing Stimulated Geologic Ammonia technology to enable ammonia as a primary energy resource. The proposed technology will leverage oil and gas techniques to react ferrous iron resources with engineered fluids to produce ammonia. Addis Energy will combine experimental results with computational modeling to scale from batch reactions to a field pilot demonstration. Their approach overcomes the challenges of high energy costs and carbon intensity of current ammonia production pathways by harnessing the chemical and thermal potential of the Earth's natural resources.

ALUMINIO INC. – San Carlos, CA

Novel Current Collectors for Low Cost, Sustainable Terawatt Hour Energy Storage – $3,000,726

Aluminio Inc. is developing novel current collector technology to reduce the production cost of lithium iron phosphate (LFP) based lithium-ion batteries. This technology will replace copper as a current collector on the anode side of LFP cells with an alloy foil composed of lightweight and abundant base metals. The proposed technology will be applicable to all commercially relevant lithium-ion batteries, with end use applications such as electric vehicles and battery energy storage systems.

CIRCULARITY FUELS – Redwood City, CA

Efficient, Compact Conversion Between Electricity or Geologic Hydrogen and Synthetic Natural Gas – $3,600,000

Circularity Fuels is developing novel reactor and catalyst technologies for the purpose of using clean energy to convert biogenic or atmospheric carbon dioxide (CO_2) streams to carbon-neutral fuels. The proposed technology will efficiently capture and convert atmospheric CO_2 to synthetic natural gas. The proposed technology will be applicable to high-purity methane, propellant grade methane, renewable natural gas, biogas upgrading, and liquid fuels production (e.g., sustainable aviation fuel, low sulfur diesel) markets.

COLDQUANTA, INC. DBA INFLEQTION – Boulder, CO

Enhancing Neutral-atom Computers for Optimizing Delivery of Energy – $6,165,189

Infleqtion is developing a quantum computing system and algorithmic toolset for the purpose of improving the efficiency of the energy grid. The project team will deliver higher quality unit commitment solutions than are achievable through classical methods with scale and runtime consistent with energy-sector workflows. The proposed technology will be applicable to the energy sector, enabling energy efficiency, stability, and intelligent power utilization.

FORM ENERGY, INC. – Somerville, MA

Regenerative Metal Fuels for Renewable Energy Transmission without Wires – $3,455,344
Form Energy, Inc., is developing a novel technology approach to large-scale, dynamic energy transport. The technology will utilize electrochemical processes and existing logistics infrastructure for the purpose of overcoming the traditional barriers to bulk energy transport: time and cost to build new electrical transmission lines. The project team will leverage globally abundant, non-critical metals to serve as energy carriers and innovative metal-air fuel cells and low temperature metal electrolyzers for energy conversion. The proposed technology will be applicable to electricity providers such as independent power producers, electric utilities, and system operators.

FORTESCUE – Golden, CO

From Iron Ore Tailings to Hydrogen: Heavy Industry Decarbonization and Waste Valorization – $3,000,000
Fortescue is developing an iron ore tailing (IOT)-to-hydrogen technology for the purpose of valorizing abundant mine waste as an energy source at remote locations. The technology will use ferrous iron-bearing tailings, water, and a reactor to enhance the natural iron oxidation reaction. It will then capture the hydrogen generated for use on-site, in vehicles, heating, and backup power. The proposed technology will be applicable to the mining industry and other hard to decarbonize industries located in remote regions with access to iron-bearing waste.

GE VERNOVA ADVANCED RESEARCH – Niskayuna, NY

Dynamic Grid Foundation Model-Based Rapid Decision Support for Fully Dynamic Grid – $3,431,271
GE Vernova Advanced Research is developing a Dynamic Grid Foundational Model (DynaGridFM) technology for the purpose of providing rapid, trustworthy, and proactive decision making for reliable grid operations. The project team will leverage recent advances in generative artificial intelligence, time-series modeling, and graph neural networks to develop a grid operation foundation model that can predict violations and identify mitigation plans. The proposed technology will be applicable to transmission grid operators, independent system operators, regional transmission organizations, and vertically integrated utilities.

GEORGIA INSTITUTE OF TECHNOLOGY – Atlanta, GA

Manufacturing Next Generation Turbine Blades to Meet the Global Sustainability Goal – $3,000,000
Georgia Institute of Technology is developing new adhesive joining technology for the purpose of enabling the manufacturing of segmented wind turbine blades. The project team will design a long turbine blade in shorter, segmented modules. Each segment will be manufactured in parallel and then the innovative adhesive bond techniques will be used to connect blade segments together into a fully functioning long blade. The proposed technology will be applicable to the wind energy sector, especially for offshore wind turbines that use increasingly long blades.

GENALPHA NUCLEAR TECHNOLOGIES LLC – Traverse City, MI

High-Efficiency Direct Energy Conversion Nuclear Power with Metal Foam Fuels – $1,360,836
GenAlpha Nuclear Technologies LLC is developing Structured Plasma Cell-Thermionic Energy Conversion (SPACE-TEC), a groundbreaking nuclear fuel technology for the purpose of directly converting nuclear heat into electricity. The purpose of developing SPACE-TEC is to make nuclear power of all kinds more economically competitive with other baseload energy sources. The proposed technology will be applicable to the advanced nuclear energy sector.

HALLIBURTON TECHNOLOGY PARTNERS, LLC – Houston, TX

Quantum Enhanced Radio Frequency Sensor Technology for Geothermal Evaluation and Management – $4,000,000
Halliburton Technology Partners, LLC is developing a Quantum Enhanced Photonic Radio Frequency Imaging Technology for the purpose of imaging fracture networks, enhancing operational efficiency, and improving safety

margins for enhanced geothermal systems. The proposed technology will overcome the challenge of classical depth of investigation versus resolution tradeoff issues in current approaches by employing a quantum enhanced methodology. The technology will be applicable to enhanced geothermal systems and other subsurface imaging use cases.

JUPITER VOLTA INC. – Berkeley, CA

Diamond-Metal Composite Structured Materials for Use in Extreme Environments – $3,650,789
Jupiter Volta Inc. is developing diamond-metal composite materials for use in plasma-facing structures capable of surviving the intense environment of fusion energy machines. The technology will enable confinement tubes and electrodes for use with high-temperature, high-density plasma by combining the thermal conductivity of polycrystalline diamond with the electrical conductivity and erosion resistance of tungsten. The proposed technology will be applicable to plasma thrusters, particle accelerators, and fusion energy machines.

LAWRENCE LIVERMORE NATIONAL LABORATORY – Livermore, CA

Gaseous Optics for Next Generation Fusion Energy Lasers – $2,000,000
Lawrence Livermore National Laboratory is developing gaseous optical elements technology for the purpose of manipulating high-power lasers for future laser-driven nuclear fusion power plants. The proposed technology will turn a gas into a high-quality optical element (like a mirror or lens) by imprinting transient micro-structures in the gas. These structures are created by the absorption of a low-power laser beam in the gas and the resulting initiation of waves. This technology will be applicable to future laser-based nuclear fusion power plants.

LYONDELL CHEMICAL COMPANY – Channelview, TX

Treatment of Waste Plastic Pyrolysis Oil: Transforming Waste Plastic into Base Chemicals – $1,464,656
Lyondell Chemical Company is developing technology for the purpose of purifying waste plastic pyrolysis oil (WPPO) to increase advanced recycling of plastics. The proposed technology will purify WPPO, facilitating the high-volume deconstruction of waste plastics into base chemicals such as ethylene and propylene. The technology will be applicable to advanced recycling of waste plastics to address plastic pollution.

MARATHON FUSION – San Francisco, CA

Partial Ionization Plasma Centrifuge Enabling Differential Pumping for Fusion Energy – $3,630,998
Marathon Fusion is developing partial ionization plasma centrifuge technology for the purpose of dramatically increasing tritium burn efficiency in fusion energy devices. It will enable differential pumping in fusion systems, in turn enabling preferential removal of impurity species from the plasma. The proposed technology will be applicable to fusion power development, enabling a massive simplification of fuel processing systems in these devices.

THE MITRE CORPORATION – Bedford, MA

All-Optical Chiplets for Energy-Efficient Artificial Intelligence – $3,488,687
The MITRE Corporation is developing photonic integrated circuits for the purpose of energy-efficient artificial intelligence (AI). The project team will develop new computer chiplets based on photonic integrated circuits that use light instead of electricity for computation. The proposed technology will be applicable to the emerging AI market and existing data centers.

NATIONAL RENEWABLE ENERGY LABORATORY – Golden, CO

PhOAM: Photosynthetic Overproduction of Aromatic Monomers – $2,610,000

The National Renewable Energy Laboratory is developing a direct photosynthetic production approach towards aromatic intermediate products as reactants in the production of plastics and polyurethane foams. The proposed technology will reduce the carbon and land footprint of chemical synthesis in algae through light, carbon, water, and land use optimization. The proposed technology will help meet a 7-million-ton annual chemical market demand for aromatic polymer intermediates, specifically to produce polyurethane foams, and other plastics.

NATIONAL RENEWABLE ENERGY LABORATORY (NREL) – Golden, CO

Redesigning Tires while Innovating Rubbers and Elastomers (Re-TIRE) – $2,036,620

The National Renewable Energy Laboratory is developing reversible crosslinking chemistries and bioderived elastomers for the purpose of enabling the recycling of elastomers, such as tires, to dramatically improve the energy efficiency associated with elastomer manufacturing. They will design new reversible crosslinking chemistries alongside new degradable elastomers that are compatible with today's manufacturing processes. The proposed technology will be applicable to the polymers and automotive industries.

NORTHWESTERN UNIVERSITY – Evanston, IL

Electrified Ethylene Synthesis from Post- CO_2-Capture Liquid – $4,000,000

Northwestern University is developing reactive carbon dioxide (CO_2) capture technology for the purpose of decarbonizing ethylene production. The technology will use electricity to directly upgrade the carbon in a post-direct-air-capture-liquid into ethylene, a valuable chemical commodity. The proposed technology will be applicable to chemicals and fuels, including sustainable aviation fuels.

OAK RIDGE NATIONAL LABORATORY – Oak Ridge, TN

Nested Pebble Bed Blanket (NesPeB) – $3,149,250

Oak Ridge National Laboratory plans to validate a new, groundbreaking blanket concept called "Nested Pebble Bed Blanket" (NesPeB) to address current blanket concepts' shortcomings and technical immaturity and to pave the way for "Rapid Deployment" of fusion power plants. NesPeB is based on nested pebbles, which are binary-sized lithium-ceramic pebbles enclosed in binary-sized Beryllium alloy spherical shells. NesPeB's technology will be applicable to all magnetic confinement fusion devices.

OAK RIDGE NATIONAL LABORATORY – Oak Ridge, TN

High Efficiency, Resilient Transformers for Next Generation Power Distribution Systems – $3,150,000

Oak Ridge National Laboratory is developing novel low-loss grain-oriented steel technology for the purpose of improving the efficiency of transformers used in the electric grid. The technology entails the development of novel grain-oriented steels containing higher silicon contents which will result in lower core losses. The proposed technology will be applicable to power and distribution transformers.

OAK RIDGE NATIONAL LABORATORY – Oak Ridge, TN

Engineering of Switchgrass for Sustainable Polyester Production – $3,650,000

Oak Ridge National Laboratory will use synthetic biology technology to engineer the bioenergy crop switchgrass for the purpose of enabling commercial production of cutin biopolymer to make sustainable and biodegradable packaging materials. The technology will turbocharge switchgrass as a sustainable crop for biopolymer production and will diversify domestic feedstocks for polymers beyond just petroleum. The proposed technology will be applicable to the packaging industry, which is heavily dependent on petroleum-based plastics.

OAK RIDGE NATIONAL LABORATORY – Oak Ridge, TN

AI-Based Generative Design Framework for Rapid Deployment of H_2-fueled Power Generation Technologies – $2,500,000

Oak Ridge National Laboratory is developing a pioneering high-throughput, performance-specific, and cost-effective generative materials design and discovery framework tailored for hydrogen (H_2) -fueled gas turbine technologies. It will create a specialized platform for evaluating novel materials and establishing design limits for existing alloys and addressing complex failure mechanisms specific to industrial and aeroengine H_2-fueled gas turbines. The proposed technology will be applicable equally to the power generation and transportation industries and will be leveraged by alloy and component manufacturers to design, fabricate and employ hydrogen resistant materials.

OAK RIDGE NATIONAL LABORATORY UT-BATTELLE LLC – Oak Ridge, TN

Electrochemical Manufacturing of High-Performance Graphite Based on Biomass-Derived Carbon Precursors – $3,000,000

Oak Ridge National Laboratory is developing a transformative electrochemical graphitization technology that can significantly lower energy and resource requirements compared to the traditional process. The proposed technology will utilize molten salts, such as calcium chloride ($CaCl_2$), and operate at much lower temperatures (~850°C) and shorter timescales (3-6 hours) to produce high-purity synthetic graphite. The proposed technology will be progress in efficiency and scalability, reducing the energy consumption and associated costs of graphite production and will be applicable to the electric vehicle (EV) sector and the broader energy storage industry.

OHIO UNIVERSITY – Athens, OH

Novel Ultra-conductive Carbon Aluminum Composite Cable for Efficient Power Transmission – $2,956,655

Ohio University is developing advanced ultra-conductive carbon aluminum composite (UCAC) cable with superior electrical and mechanical properties. Their goal is to improve power transmission and distribution infrastructure by increasing grid capacity, improving efficiency, and enabling seamless integration of diverse and intermittent energy sources. The proposed technology will be applicable to electrical power transmission and distribution, including utility-scale infrastructure, renewable energy integration projects, and the development and modernization of grid systems.

OSMOSES – Cambridge, MA

Harnessing GHG-Free Geologic Hydrogen to Harvest New Helium Sources in the United States – $5,200,000

Osmoses is developing a reactive hydrogen-helium separation technology for the purpose of utilizing geologic hydrogen as a greenhouse gas (GHG)-free abundant primary energy source to enable the harvesting of new helium resources. It will utilize novel, high-performance polymeric membranes coupled with a hydrogen-burning turbine to separate helium from co-occurring nitrogen and hydrogen gas. The proposed technology will be applicable to gas separation challenges across many sectors, such as industrial hydrogen recovery.

PACIFIC NORTHWEST NATIONAL LABORATORY – Richland, WA

Additive Friction Surfacing for Large Scale Additive Manufacturing with Improved Service Life in Extreme Environments – $4,525,278

Pacific Northwest National Laboratory is developing additive friction surfacing (AFS) technology for the purpose of enabling an order of magnitude reduction in lead times and improved microstructures for large steel components essential for the power generation and manufacturing sectors. AFS is a solid phase manufacturing process where a rotating bar feedstock traverses along a path while applying downward pressure. The technology employs frictional heating and shear forces to enable feedstock material to plasticize and deposit, producing microstructures in steels resulting in superior properties, compared to fusion-based additive manufacturing processes. The proposed technology will be applicable to domestic power generation and manufacturing sectors.

PENNSYLVANIA STATE UNIVERSITY – University Park, PA

Smart Screens to Control Thermal Evolution in EGS Wells – $1,500,000

Penn State is developing thermally activated cellular screens (TACS) technology for the purpose of improving the efficiency and longevity of enhanced geothermal systems (EGS). Penn State's technology will be applicable to both existing and new EGS wells, particularly in locations prone to thermal short-circuiting. Their approach overcomes challenges of premature thermal breakthrough and non-uniform heat extraction by enabling autonomous, temperature-based flow control without complex electronics or chemical treatments.

PRINCETON UNIVERSITY – Princeton, NJ

Integrated Electrolysis and Plasma Catalytic Ammonia Production for Energy Storage and Power Generation Using Renewable Electricity and Waste Industrial Heat – $3,134,946

Princeton University is developing a disruptive, integrated, non-equilibrium electrolysis and plasma catalytic ammonia production system for the purpose of intermodal green primary energy conversion, storage, and transport. The proposed technology will use a plasma assisted electrochemical reactor with renewable electricity, hydrogen, nitrogen, and waste industrial heat and water to produce green ammonia.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA – Berkeley, CA

Polyolefins to Light Olefins Catalyzed by Earth-Abundant Heterogeneous Catalysts – $3,550,000

The University of California is developing a technology for the deconstruction of polyolefins for the purpose of converting waste plastics to chemical feedstocks. The technology will use a combination of catalysts based on earth abundant metals, such as tungsten and sodium, on silica or alumina supports to convert polyethylene, polypropylene, or mixtures of the two materials. The result will be propene, a combination of propene and isobutylene, or longer-chain olefins. The proposed technology will be applicable to the plastics, chemical manufacturing, and recycling sectors to generate feedstock chemicals from waste plastics.

SAVANNAH RIVER NATIONAL LABORATORY – Aiken, SC

Prismatic TRISO Fuel Element Volume Reduction – $675,000

The Savannah River National Laboratory (SRNL) is developing graphite digestion technology for the purpose of providing significant volume reduction of spent fuel from high temperature gas-cooled reactors. The proposed technology will isolate the tri-isotropic (TRISO) spent nuclear fuel from the graphite moderator. SRNL's technology will be applicable to emerging Generation IV nuclear reactor technology.

SHELL GLOBAL SOLUTIONS (US) INC. – Houston, TX

Molten Salt Methane Pyrolysis – $5,500,000

Shell Global Solutions (US) Inc is developing a Molten Salt Methane Pyrolysis technology for the purpose of producing low cost, low carbon intensity hydrogen. The technology will utilize a newly developed process and catalyst to decompose methane into hydrogen and solid carbon. The proposed technology will be applicable to markets requiring low carbon intensity hydrogen and solid carbon.

SKYVISION SCIENCES, LLC – Westford, MA

New Generation of PEM Water Electrolyzers – $1,877,782

SkyVision Sciences is developing a new generation of protein exchange membrane (PEM) water electrolyzers for the purpose of producing green hydrogen at less than $2/kg of hydrogen. The technology uses a disruptive water electrolyzer design that substantially reduces the capital cost, while maximizing the electrochemical performance helping to lower the operating costs. SkyVision's approach uses new materials, designs, and manufacturing processes to overcome high operating and capital costs associated with conventional PEM water electrolyzers.

SRI INTERNATIONAL – Palo Alto, CA

Recyclable Composite with Depolymerizable Resin – $2,206,029

SRI International is developing a novel recyclable thermoset resin and a closed-loop recycling technology for the purpose of enabling fully recyclable fiber reinforced polymer (FRP) composites. The technology will recycle the composite by recovering the initial resin precursors and the fiber weaves from end-of-life FRP parts and reusing these constituents to produce fresh FRP parts with strength comparable to those of virgin composites. The proposed technology will be applicable to automotive, aerospace, wind, and construction sectors.

SYZYGY PLASMONICS INC. – Houston, TX

Electrified Low-Pressure Green Ammonia for Carbon-Free Energy Future – $2,500,000

Syzygy Plasmonics Inc. is developing low-pressure, fully electric green ammonia (NH_3) production photoreactor technology for the purpose of advancing dispatchable carbon-free energy and fuel infrastructures. It will leverage a synergy of innovations in catalysts and photoreactor system design with light powered by renewable electricity to offer sustainable NH_3 production under significantly milder conditions compared to the conventional Haber-Bosch process. The proposed technology will be applicable to a diverse range of markets and end-users in the energy and fuel production, agriculture, and chemical manufacturing sectors.

TEXAS A&M UNIVERSITY – College Station, TX

Graphite from Petroleum Coke – $2,629,000

Texas A&M University is developing a new catalytic technology for the purpose of processing petroleum coke into graphite. The technology will allow for domestic coke-to-graphite production at much lower temperatures, costs, and emissions than current approaches. The proposed technology will be applicable to the petrochemical industry's production of petroleum coke to produce graphite for energy storage.

UNIVERSITY OF AKRON – Akron, OH

Double AC Overhead Circuit Utilization with Blended DC Transmission Line Edging – $2,296,450

The University of Akron is developing energy integration technology for the purpose of enhancing the transmission and distribution capacity of existing alternating current (AC) lines by blending with the high voltage direct current (DC) energy networks. It is intended to achieve active DC and AC blocking through power converters to segregate AC and DC at relevant sources and loads. The proposed technology will be applicable to electric transmission, distribution, and energy storage sectors.

THE UNIVERSITY OF AKRON – Akron, OH

Chemi-Mechanical Recycling of Mixed Plastic Residues by Reactive Solvothermal Blending and Purification – $3,143,289

The University of Akron is developing a chemi-mechanical recycling technology for the purpose of blending and purifying mixed plastics. It is a novel method for removing volatile organic compounds and pigments to produce reusable plastic films of manufacturing quality. The proposed technology will be applicable to plastic manufacturers, recyclers, and material recovery facilities to benefit consumer packaged goods companies.

UNIVERSITY OF COLORADO BOULDER – Boulder, CO

Universal Ultra-High-Density AC-DC Electrical Power Mover for the Future Intermodal Energy Superhighway – $1,392,054

The University of Colorado Boulder is developing electrically and mechanically stackable, low-to-medium voltage compatible, reconfigurable building block technology for the purpose of enabling electrical energy flow to and from the point of use. Their approach overcomes challenges of design, labor, manufacturing, deployment, and maintenance costs through modularity, reconfigurability, power scalability, transformerless MV-compatibility, and robustness. The proposed technology will be applicable among industries that use distributed grid-tiered systems, such as EV charging and energy storage.

UNIVERSITY OF DELAWARE – Newark, DE

Recycling of Polyolefins via Novel Electrothermochemical Processing – $2,600,000

The University of Delaware is developing an electrothermochemical technology for the purpose of converting plastics waste to monomers. The technology will use electricity to produce a field and drive the conversion in seconds using inexpensive catalysts and scalable processes. The proposed technology will be applicable to the global recycled plastic sector, specialty chemicals companies making surfactants, alcohols, and synthetic lubricants, plastics production companies, consumer goods, and retail brand owners.

UNIVERSITY OF NEBRASKA-LINCOLN – Lincoln, NE

Lateral-scaling Orthogonal-cooling Packages for Next-generation MVAC-LVDC Distribution Infrastructure (LincolnPak) – $1,802,642

The University of Nebraska-Lincoln is developing a LincolnPak power module and an S6T power factor correction rectifier to revolutionize next-generation ultra-efficient, power-dense medium voltage alternating current/low voltage direct current grid distribution infrastructure. This is intended to address the growing demands of artificial intelligence data centers and electric vehicle fast chargers. The technology will be applicable to grid distribution, fusion, carbon dioxide methanation, and defense, among other applications.

THE UNIVERSITY OF TEXAS AT AUSTIN – Houston, TX

Improving the Energy Recovery Rate in Enhanced Geothermal Systems – $4,033,588

The University of Texas at Austin is developing technology to increase the energy recovery in enhanced geothermal systems (EGS) by 200% to 500% by increasing the contact area between the connected fracture system and the reservoir rock matrix. The proposed technology is a high temperature sliding sleeve that will operate at temperatures up to 225 degrees Celsius and deliver the following key features: (i) create individual fractures with a well-defined geometry (known fracture length, width and orientation); (ii) ensure that the fractures are nominally orthogonal to the wellbore by creating the fractures in an alternate-stage sequence (not just from toe to heel); (iii) control the flow distribution into each fracture by ensuring uniform fractures and adjusting the slot opening in each sleeve. The proposed technology will be applied to future enhanced geothermal systems.

UNIVERSITY OF TEXAS AT DALLAS – Richardson, TX

Robotic-Assisted Laser Joining of Large and Complex SiC Components for Harsh Environment Energy Technologies – $1,583,530

The University of Texas at Dallas is developing a robotic-assisted laser joining technology for the purpose of enabling robust, high-temperature-resistant, and hermetic joining of complex and large silicon carbide (SiC)-based materials. The goal of the project is to achieve high-strength and durable joints that can withstand harsh operating conditions. The proposed technology will be applicable to energy sectors, including nuclear reactors, heat exchangers for waste heat recovery and supercritical carbon dioxide power cycles, thermal energy storage systems, and hydrogen-burning turbines.

UNIVERSITY OF WISCONSIN-MADISON – Madison, WI

Building Plant Chemical Platforms for Efficient Aromatic Production Directly from CO_2 – $2,810,000

University of Wisconsin-Madison is developing plant-based "living refineries" technology that utilize sunlight energy and convert atmospheric carbon dioxide (CO_2) directly into aromatic compounds, essential to modern society. The technology will be applicable to the vast chemical industry, as aromatics serve as essential building blocks for many of society's most important industrial products, including plastics, fuels, resins, and semiconductor materials.

UNIVERSITY OF WISCONSIN-MADISON – Madison, WI

An Electrically Rechargeable Fuel for Chemical Wires that Connect Electrical Power Networks – $2,334,274
The University of Wisconsin-Madison is developing an electrolyzer for the purpose of turning electricity into chemical fuels that can be affordably transported from areas of high electrical supply to areas of high electrical demand for discharge and reuse. The proposed technology will be applicable to industries that produce excess electrical power and industries that need power but cannot be easily or affordably connected to the grid.

WASHINGTON STATE UNIVERSITY – Pullman, WA

Caustic Aqueous Phase Reforming for Carbon-Negative and Process-Intensified H_2 production – $3,325,688
Washington State University is developing Caustic Aqueous Phase Reforming (C-APR) technology for the purpose of producing carbon-negative, clean hydrogen from raw bioethanol (i.e., ethanol plus water solution from the fermentation process). It is pursuing a scale suitable for a distributed and grid-free electrical vehicle (EV) charging station application. These stations will offer a sustainable, versatile solution to support the U.S.'s growing EV fleet while minimizing impact on an already strained electric grid.

VIRTUS SOLIS TECHNOLOGIES, INC. – Troy, MI

Virtus Solis Wireless Power Transfer – $1,922,273
Virtus Solis Technologies is developing long-distance wireless power transfer (WPT) for the purpose of connecting energy generation with demand, including extending the grid into outer space with applications for Space Based Solar Power as the primary intended use case. The technology will demonstrate significant improvements to the state of the art end-to-end (direct current to direct current) efficiency for long distance WPT. The proposed technology will be applicable to the electric grid by improving its resiliency and flexibility without the need for fixed cabling and energy storage assets.

XCIMER ENERGY, INC. – Denver, CO

HYbrid Pumped ExcimeR Laser – $4,000,000
Xcimer is developing an innovative technology to enhance the power delivery system for laser drivers, for the purpose of improving the efficiency of high-power excimer lasers. The technology will leverage efficient microwave sources in combination with electron beams to energize excimer gas lasers used in generating laser-based inertial fusion energy. The proposed technology will be applicable to commercial, large-scale adoption through Xcimer Energy's roadmap for deploying inertial fusion energy power plants by the mid-2030s.

YALE UNIVERSITY – West Haven, CT

Rapid, Direct, Catalyst-Free Synthesis of High-Performance Carbon Allotropes Using an Ultrahigh-Temperature Stable Plasma Platform – $3,600,000
Yale University is developing an ultrahigh-temperature stable plasma platform for the purpose of achieving high-performance carbon allotropes. The technology will utilize a uniform ultrahigh temperature to convert biomass, plastic waste, and carbon black to carbon allotropes, such as carbon nanotubes and graphite. The proposed technology will be applicable to electronics and energy storage.