

## XIII.0 Small Business Innovation Research (SBIR) Hydrogen Program New Projects Awarded in FY 2012

The Small Business Innovation Research (SBIR) program provides small businesses with opportunities to participate in DOE research activities by exploring new and innovative approaches to achieve research and development (R&D) objectives. The funds set aside for SBIR projects are used to support an annual competition for Phase I awards of up to \$150,000 each for about nine months to explore the feasibility of innovative concepts. Phase II R&D efforts further demonstrate the technologies to move them into the marketplace, and these awards are up to \$1,000,000 over a two-year period. Small Business Technology Transfer (STTR) projects include substantial (at least 30%) cooperative research collaboration between the small business and a non-profit research institution.

Tables 1 and 2 list the Phase-I and Phase-II (respectively) SBIR projects awarded in FY 2012 related to the Hydrogen and Fuel Cells Program. Brief descriptions of each project follow.

**TABLE 1.** FY 2012 Phase-I SBIR Projects Related to the Hydrogen and Fuel Cells Program

Title	Company	City, State
XIII.1 Using ARB Biotech for H2 Generation and Efficient Commercial Wastewater Treatment	Arbsource, LLC	Tempe, AZ
XIII.2 Low-Noble-Metal-Content Catalysts/Electrodes for Hydrogen Production by Water Electrolysis	Proton OnSite	Wallingford, CT
XIII.3 Low-cost Integrated Nanoreinforcement for Composite Tanks	Nextgen Aeronautics, Inc.	Torrance, CA
XIII.4 Novel Structured Metal Bipolar Plates for Low Cost Manufacturing	Treadstone Technologies, Inc.	Princeton, NJ

**TABLE 2.** FY 2012 Phase-II SBIR Projects Related to the Hydrogen and Fuel Cells Program

Title	Company	City, State
XIII.5 Ultra-Lightweight High Pressure Hydrogen Fuel Tanks Reinforced with Carbon Nanotubes (Phase II Project)	Applied Nanotech, Inc.	Austin, TX
XIII.6 New High Performance Water Vapor Membranes to Improve Fuel Cell Balance of Plant Efficiency and Lower Costs (Phase II Project)	Tetramer Technologies, LLC	Pendleton, SC

### PHASE I PROJECTS

#### XIII.1 Using ARB Biotech for H2 Generation and Efficient Commercial Wastewater Treatment

Arbsource, LLC  
 1235 W Laird Street  
 Tempe, AZ 85281-5312

Food and beverage processors are burdened with the high cost of managing wastewater, totaling six or seven figures per year just in operations. This project will cut this cost in half by supplying low-energy high-quality wastewater treatment for customers, and it is expected to deliver a two year payback period.

## **XIII.2 Low-Noble-Metal-Content Catalysts/Electrodes for Hydrogen Production by Water Electrolysis**

Proton OnSite  
10 Technology Drive  
Wallingford, CT 06492

Proton OnSite manufactures hydrogen generation systems that can be integrated with renewable energy sources to generate hydrogen fuel, while producing a minimal carbon footprint. This project aims to reduce the cost of this technology through development of improved electrode materials designed to reduce use of expensive raw materials and overall system capital cost.

## **XIII.3 Low-Cost Integrated Nanoreinforcement for Composite Tanks**

Nextgen Aeronautics, Inc.  
2780 Skypark Drive, Suite 400  
Torrance, CA 90505

This project will incorporate a low-cost nanoreinforcement into high-pressure all-composite tank designs to further increase pressure and lower costs. NextGen proposes the development of a Low-cost Integrated Nanoreinforcement design for composite tanks. Partners are Precision Nanotechnologies and Lincoln Composites. NextGen will electrodeposit polyacrylonitrile nanofibers to Lincoln's 240-bar and 700-bar Type IV tanks. Early results have shown significant improvement in the fracture toughness of Toray fiber composite with no measurable increase in mass. They are targeting 10% improvement in burst strength and 30% improvement to the burst after impact strength, which could reduce the amount of carbon fiber needed and reduce the overall cost of the tank.

## **XIII.4 Novel Structured Metal Bipolar Plates for Low-Cost Manufacturing**

Treadstone Technologies, Inc.  
201 Washington Road  
Princeton, NJ 08540

This project will develop a low-cost novel-structured metal bipolar plate technology for low-temperature polymer electrolyte membrane fuel cells for transportation applications.

## PHASE II PROJECTS

### **XIII.5 Ultra-Lightweight High Pressure Hydrogen Fuel Tanks Reinforced with Carbon Nanotubes**

Applied Nanotech, Inc.  
3006 Longhorn Blvd.  
Austin, TX 78758

Carbon fiber is very expensive, ranging from \$20-\$50 per kilogram. This work will develop technologies that will reduce the dependence on carbon fiber material needed in carbon fiber reinforced plastic (CFRP) tanks through carbon nanotube reinforcement. Using nano-reinforcement upon the composite resin matrix will result in a reduced amount of required carbon fiber for CFRP tanks while making them more lightweight and efficient.

### **XIII.6 New High Performance Water Vapor Membranes to Improve Fuel Cell Balance of Plant Efficiency and Lower Costs**

Tetramer Technologies, LLC  
657 South Mechanic Street  
Pendleton, SC 29670-1808

This project's new water vapor membrane technology will create 20 high paying jobs in South Carolina while helping the U.S. lower its dependence on foreign oil. Already growing modestly in the U.S., the fuel cell commercial enterprise will be accelerated with the higher performance and lower costs targeted in Phase II.