EnerG2 Announces New Advancements in the Science of Energy Storage

U.S. Department of Energy backed company expands innovative materials science platform to enhance the next generation of energy storage applications

SEATTLE – April 5, 2011 - EnerG2, a Seattle-based company producing advanced nano-structured materials for next-generation energy storage breakthroughs, today announced a new energy storage application research platform. Based upon the company's proprietary carbon processing technologies, the EnerG2 Carbon Technology Platform will rapidly advance the speed with which carbon technologies are developed and applied to energy storage applications.

Carbon is a key component of numerous battery chemistries and architectures, including lead acid batteries, traditional Lithium Ion batteries, next-generation Lithium batteries, ultracapacitors, and adsorbed natural gas storage. EnerG2 is working with industrial, academic and governmental institutions in each of these categories to incorporate advanced carbon technologies into the next generation of devices.

Using EnerG2's patented, activated carbon technologies, the Carbon Technology Platform provides a flexible processing platform through which the company's scientific team directly focuses on the rapid and iterative synthesis of novel nanostructured carbon materials. These ultra-high purity carbon materials may also incorporate a variety of metals, oxides, alloys, and other catalysts for use in energy storage devices and serve as a delivery "scaffold" for other advanced materials that can further improve the performance of these all-important devices.

EnerG2's material development processes build carbon materials from the ground-up, at the molecular level, rather than via traditional methods of top-down carbonization of natural precursors. The materials that result from the Carbon Technology Platform have inherently high purity, an order of magnitude more pure than traditionally-produced carbons. Because the Carbon Technology Platform utilizes pure precursors, EnerG2 carbon has less than $1/10^{th}$ of the impurities that are found in other activated carbons.

In addition to delivering ground-breaking purity, the Carbon Technology Platform is used to manipulate at the nano-scale the pore structure for the insertion of active material at a variety of key points in the production process. Carbonic materials with such tunable pore size distributions, combined with the select addition of electrochemically active materials into the carbon matrix, will be useful for such diverse applications as Li-ion anodes, Li-air cathodes, alkali-sulfur cathodes, pseudocapacitors, lead acid batteries and industrial gas storage, including hydrogen and natural gas.

"As our nation focuses more on energy policy, usage efficiency, and methods of clean energy generation, the need for more effective energy storage devices has become critical," said Rick Luebbe, CEO of EnerG2. "Our ability to develop increasingly affordable

energy storage devices depends on cutting-edge research. The EnerG2 Carbon Technology Platform was designed to leverage the fundamental mechanisms that govern the performance of electrochemical energy storage systems."

Detailed scientific knowledge of engineered materials and their interplay, as well as the assembly of functional structures at the nanoscale, will ultimately facilitate the development of a wide variety of next-generation energy storage devices – devices that will help improve the energy efficiency of everything from hybrid and electric vehicles to industrial cranes and forklifts to natural gas and hydrogen storage to more efficient energy grids the world over.

EnerG2, with support from the United States Department of Energy and the Washington State Energy Program, is creating advanced energy storage capabilities with a special emphasis on enhancing the following device types:

High Purity Carbons for Enhanced Lead Acid Batteries

Lead acid batteries are the energy storage backbone for a variety of applications – from automotive to industrial motive to power backup. However, increasing power and cycle demands have limited the industry's growth and pushed manufacturers to seek new approaches, specifically the inclusion of carbons in the active materials. The EnerG2 Carbon Technology Platform has produced advanced carbon properties tailored for lead acid electrochemistry while avoiding the deleterious effects of metallic impurities found in traditionally-produced carbons.

Nanostructured Catalyst Scaffolds For Next Generation Lithium Batteries

EnerG2 is working with key industry partners to leverage the Carbon Technology Platform to develop and demonstrate a high performance Li-air battery. This engineered carbon electrode advances energy storage possibilities by creating a game-changing performance improvement in the demonstrated energy density and cycle life of the Li-air battery. The Carbon Technology Platform will ultimately lead to cost-effective volume production of these critical new electrode forms including, in some cases, novel cathode structures using various combinations of sodium, lithium and sulfur.

Nanostructured Doped-Carbon Anodes for High Capacity Lithium Ion Cells

The graphitic carbon materials traditionally used to produce Li-ion anodes are limiting the performance of the today's Li-Ion battery. Rather than rely only on the lithium intercalation capability of graphite, the Carbon Technology Platform allows for the application of much more effective materials to produce much higher performing, lower cost carbon anode materials.

High Purity Nanostructured Carbons for High Voltage Ultracapacitors

Ultracapacitors store energy by electrostatically aligning ions along the vast surface area of activated carbon in the electrodes of the device. The key voltage limitation of traditionally manufactured activated carbons is their inherent content of metallic impurities. The ultra-high purity carbons produced by the EnerG2 Carbon Technology Platform will deliver much higher device performance by enabling operating voltages not available with traditional carbons.

Adsorbed Natural Gas Storage

Affordable, distributed natural gas storage can offer an attractive and immediately viable alternative to petroleum-based fuels that produce vehicular emissions with substantially higher CO_2 concentrations. Despite this clear advantage, no natural gas storage systems have been developed that meet the storage densities, safety and cost targets necessary for practical commercialization. The EnerG2 Carbon Technology Platform can be used to develop carbons for adsorbed natural gas storage that will dramatically improve the operating costs of current compressed natural gas systems.

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“There’s a gap in our fundamental scientific understanding of the electrochemical mechanisms that control the efficiency of how electrical energy is converted and stored chemically in advanced batteries,” said M. Stanley Whittingham, Professor of Chemistry and Materials Science and Director of the Institute for Materials Research at SUNY-Binghamton. “To close this gap, scientists must understand the relationship between carbon and active electrochemical materials used in batteries, fuel cells, capacitors, and air - this is the critical challenge that scientists at EnerG2 are presently undertaking.”

In addition to support from the United States Department of Energy and the Washington State Energy Program, EnerG2 has a strong track record of backing from the public and private sectors. Among the company's supporters: the University of Washington, the Washington Technology Center, WRF Capital, the Sustainability Investment Fund, Northwest Energy Angels, the Frontier Angel Fund, OVP Venture Partners, Yaletown Venture Partners, Firelake Capital Management and strategic partner Oregon Freeze Dry. In Albany Oregon, the company will operate the first facility in the world dedicated to the commercial-scale production of nano-engineered synthetic high-performance carbon electrode material.

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