

ITE Express News

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The Army Corps of Engineers has entered into a cooperative agreement with the Advanced Technology Institute (ATI) to deploy 10 fuel cell backup power units in three mission-critical applications at Fort Jackson, SC. The 18 month project will assess the performance, durability and life cycle costs of commercially-available fuel cell technology to provide critical backup power to the Telecommunications Center, Energy Monitoring and Control Facility, and Emergency Services Center. The U.S. Department of Energy and South Carolina Research Authority, the parent organization of ATI, are partners in the project. The total funding to support the deployment, shared among the partners, is approximately \$500,000. LOGANEnergy of Roswell, GA, will procure and install the fuel cell equipment. The team plans to showcase this project during the 20th annual National Hydrogen Association Conference, which will be held in Columbia, SC, beginning on March 30, 2009.

Boston Power has obtained \$55 million in fourth-round funding to grow its manufacturing, sales and marketing operations. Its Sonata brand Li-Ion battery will launch in the next several months as the primary power source for Hewlett-Packard notebook computers. The Company says that their Sonata battery can power other electronic devices and electric vehicles. Sonata batteries can be charged 1,000 times before their run-time starts to shrink, and can also be charged to 80% capacity in a half hour.

The Sanyo - Nippon Oil Corp. joint venture is slated to start mass-production of home use fuel cells in April 2009 with full-scale sales of fuel cell systems in Japan in the year

ending March 31, 2010. A network comprising over 100, liquefied petroleum gas (LPG) and kerosene sales agents will be organized with sales of 10,000 units targeted for fiscal 2010. The Japanese government is expected to start subsidizing fuel cell installations in fiscal 2009 as a measure for reducing Japan's global warming gas emissions. By fiscal 2015, the company hopes to lower the price of its household fuel cell systems to around ¥500,000 (US\$5,500) and bolster their sales to 40,000 units a year.

Idemitsu Kosan Co., in partnership with Toshiba, is also developing home-use fuel cell systems.

Samsung SDI reported a net profit of 38.9 billion won (\$28.28 million) for 2008, compared to a loss of 592 billion won (\$432 million) in 2007. Samsung SDI sells rechargeable batteries, plasma screens, etc. They posted sales of 3.73 trillion won (\$272 billion) for 2008, down slightly from 3.79 trillion (\$277 billion) in 2007.

In the December 23, 2008, the online edition of **Nano Letters**, researchers from Stanford University lead by Dr. Yi Cui reported that they created silicon (Si) nanowires consisting of a crystalline Si core solid wire surrounded by a disordered, or "amorphous," structure. This work builds upon their earlier result published in January 2008 in **Nature Nanotechnology** using a single-crystal nanowire to achieve a charge storage capacity ten times that of carbon. The amorphous silicon seems to perform better over many cycles. It also reacts with lithium at a higher electric potential, a convenient way of making ion storage the exclusive job of the amorphous

shell. If the potential is maintained at the higher level, lithium ions cannot be stored in the core. Cui and his colleagues found that the amorphous shell does expand when limiting the charging potential, but not significantly. The wires have a high charge-storage capacity of about three times that of carbon while retaining the capacity at the 90% level over 100 charge-discharge cycles. The core-shell nanowire design enables a very fast cycle, about seven minutes.

Cyrus Ashtiani has joined EnerDel as the it's new Chief Technology Officer. Ashtiani comes to EnerDel from the Chrysler Hybrid Powertrain Center, where, along with his Chrysler duties, he also served as Chairman of the technical committee of the U.S. Advanced Battery Consortium (USABC). A decade ago, Ashtiani was responsible for putting the first-ever Li-Ion battery system in a hybrid vehicle, the Dodge ESX3. He is a seasoned leader with a unique understanding of the multi-disciplinary challenges involved in the technology. Ashtiani said, "The U.S. has an opportunity today to be a global leader in advanced Li-Ion batteries if we're willing to make the investment." Ashtiani has a Ph.D. in electrical engineering from McGill University, with a specialization in electrical machines and power systems. He has pioneered a Battery Safety Methodology, Cell Balancing Systems, Battery Management Systems, Battery Preheating Circuitry, and State-of-Charge algorithms for HEV batteries. He received the SAE Vincent Bendix Award for Excellence in Automotive Electronics Engineering in 2002 for pioneering work on battery management systems.

Texas Instruments has announced a solar energy harvesting (SEH) development kit that converts ambient light into power for industrial, transportation, agricultural and commercial applications. The credit card-sized eZ430-RF2500-SEH kit combines Cymbet Corporation's EnerChip thin-film battery technology with TI's MSP430 microcontrollers (MCU), CC2500 radio frequency (RF) transceivers and the eZ430-RF2500 devel-

opment tool. Developers can now build self powered solar-based wireless sensor networks, eliminating system batteries, which cost time and money to replace periodically, especially in remote locations. The Cymbet battery is based on the Oak Ridge solid state rechargeable lithium technology. A high efficiency solar panel connected through the EnerChip energy harvesting module delivers enough power to run the wireless application even under low ambient light. Cymbet EnerChips are environmentally friendly, rechargeable and efficient enough to send up to 400 transmissions from a single charge when no ambient light is available. A sample kit, eZ430-RF2500-SHE, is now available via the TI e-store or authorized distributors. Visit: www.ti.com/ez430-RF2500-SEHpr.

Global Electric Motorcars (GEM), a Chrysler-owned company, actually had its "best year ever" in 2008. GEM makes battery-powered neighborhood cars, those bubble-shaped conveyances often dismissed by serious car people as street-legal "golf carts". GEM, based in Fargo, N.D., and in business 11 years, has 40,000 vehicles in operation in the United States. This is a growing but small fraction of the mass-produced automobiles with traditional internal combustion engines.

EEStor of Cedar Park, TX has developed a 127.7kg prototype dubbed as an EESU (Electrical Energy Storage Unit) and claims to have a capacitance of 30.693 Farads that can store 52,220 kWh of energy. The prototype is made up of 31,353 smaller units arranged in parallel. The EEStor prototype was charged and discharged over a million times with no change in capacity. The unit runs at 3500 volts.

EaglePicher Medical Power LLC has leased 20,000 square feet in Plano, TX that will initially employ 30 people. The facility is scheduled to open in March. EaglePicher expects to hire 30 to 40 more people at mid-year, when a manufacturing component is added. The R&D center will include labora-

tories and equipment for testing and manufacturing lithium batteries. The company makes batteries for pacemakers, implanted cardio defibrillators, heart monitors, cochlear implants, pain management devices, neurostimulators and spinal cord and deep-brain stimulators.

Tokyo Gas, Osaka Gas Co., Nippon Oil Corp., Toho Gas Co., Saibu Gas Co. and Astomos Energy Corp., a joint venture between Idemitsu Kosan Co. and Mitsubishi Corp., will join together and launch the ENE Farm brand of home-use fuel cell systems on May 1. The new product is designed to replace gas cookers and water heaters with electrical powered systems. The six companies aim to sell 5,000 units of the system in the first year. The ENE Farm units produce hydrogen from the water-gas reaction. Carbon dioxide emissions from the ENE Farm system are estimated to be 45% less than those from existing water heaters. The product competes with existing water heaters such as Eco Cute which have reached 1.6 million units in sales. The ENE Farm system starts at ¥3.2 million (\$35,965). Households will need to pay at least ¥1.8 million (\$20,230) even if government subsidies of up to ¥1.4 million (\$15,730) per unit are taken into account.

The University of Wollongong's (UOW) Intelligent Polymer Research Institute (IPRI), New South Wales (NSW), Australia, and **Kangnung University**, Gangwon, South Korea, will join in an effort to develop a new high-performance energy storage device. They were chosen to receive a US\$100,000 joint research grant. The Korean and Wollongong researchers hope to use nanotechnology to develop a new high-performance energy storage device that combines the advantages of both Li-Ion batteries and supercapacitors. The University of Wollongong team will be led by Professor Gordon Wallace.

Jadoo Power Systems was awarded a SBIR (Small Business Innovation Research)

contract to continue development of ammonia borane (AB) based materials for advanced hydrogen generation systems. Ammonia borane compounds have been shown to deliver an 80% reduction in system weight for unmanned aerial vehicles, ground sensors and portable power applications. A 240 mg pellet of solid ammonia borane is capable of producing 500cc of hydrogen. A solid material with high hydrogen content reduces the volume required for hydrogen storage and the need for high pressure storage. Jadoo will deliver a military-ready power system utilizing AB based materials.

Ballard Power Systems released preliminary numbers for 2008 showing revenue of \$59 million, up by 15% adjusted for last January's divestment of its automotive fuel cell business, on which it booked a \$97-million gain. The year's shipments totaled 1,855 units, and the consumption of operating cash decreased 24% to \$29 million. The company ended 2008 with \$85 million in cash and no debt. Shipments are forecast to reach 4,000 units this year - 1,000 for forklifts, 2,500 for backup power and 500 for residential cogeneration concentrated in Japan. Revenue is projected at between \$68 million and \$78 million. The cash burn is forecast to between \$17 million and \$27 million. The material-handling segment offers huge growth prospects.

Energizer reported that profit rose to \$111 million in the fiscal first quarter that ended on Dec. 31, 2008, up from \$102.6 million, a year earlier. Earnings fell to \$1.93 per share. The gross margin improved by 2 percentage points, excluding an inventory write-up from the prior year, and helped by a focus on more profitable premium and lithium batteries and shaving equipment. At the same time, Energizer cut spending on advertising and promotions nearly 22%. Net sales fell 12.4% to \$1.04 billion. Sales declined in both the household products unit, which makes batteries, and the personal care unit, which makes Playtex products and Banana Boat sunscreen. "We feel good about our com-

petitive position in both businesses, but future performance is greatly dependent on the overall economic environment," said Chief Executive, Ward Klein.

California start-up Better Place and Danish utility Dong Energy have secured almost \$103 million in equity and convertible debt that will go toward constructing stations where drivers can swap for fresh batteries for electric cars. Better Place's business plan focuses on building a network of automated battery-swapping stations to rapidly charge or obtain fresh batteries by 2011. They will address the range limitations of existing car batteries along driving corridors. Although Better Place has announced agreements with the governments of Israel, Hawaii, Portugal, and San Francisco for its network of charging stations, Denmark appears to be the first to secure financing to build the charging infrastructure. Dong Energy has excess wind power capacity that can be used for charging electric cars. Denmark now gets 20% of its electricity from wind turbines, but a portion of that electricity is exported because it can't be stored economically. The structure of the deal underlines the infrastructure that needs to be in place before electric cars can be used by large numbers of consumers. Utilities need to be involved to understand and manage the shift in power-grid load that electric cars bring. Government incentives need to be in place to overcome the higher cost of battery-powered vehicles. In Denmark, the government does not levy a sales tax on electric cars. Better Place has hired former Microsoft Europe executive Jens Moberg as CEO of Better Place Denmark.

Protonex Technology Corp. has developed its M250-B, a 250-watt methanol fuel cell aimed at recreational vehicle owners. The M250-B fuel cell is housed in a black plastic shell, weighs about 40 pounds, and is designed to run for about eight hours on one gallon of methanol. The M250-B can plug directly into an RV's existing power system and provide enough electricity for a limited number of appliances, but not air condition-

ing. The fuel cell recharges the battery which, in turn, powers the appliances. Protonex posted revenue of \$7.9 million and a loss of \$10.9 million in the 2008 fiscal year ended Sept. 30. Protonex has not yet priced the M250-B but expects to market the M250-B directly to consumers itself. Protonex, currently employs about 95 people in Southboro, MA and Colorado, plans to manufacture small quantities of the M250-B while qualifying outside manufacturers to produce the fuel cell in larger volumes when necessary. Protonex would also sell methanol directly to consumers. Initial pricing is in the range of \$8,000 to \$9,000. The market for an RV fuel cell is aimed at an estimated 8.2 million U.S. households. RVs can use batteries, generators or connections to power sources at campgrounds. Some are installing solar panels on the roofs of their vehicles or rigging up wind power systems that cost less than \$700. SFC Smart Fuel Cells AG of Germany recently reported that 37 international motor home manufacturers will make the SFC fuel cells available in 2009 models.

J.B. Straubel, Chief Technical Officer at Tesla Motors, said that there is no question that we can make 10 million electric cars. The motors and power electronics are not a problem. But batteries are beyond the existing manufacturing base. A whole new industry is required to make the batteries, and that industry is as big as the cars themselves. If you commandeered all the Li-Ion battery manufacturing capacity in the world today, you would be able to make about 1 million plug-in cars a year. U.S. firms are turning to the federal government for help. A123 has applied for a \$1.84 billion low-interest loan from the Energy Department under the advanced vehicle technology program, created by energy legislation in 2007, to build manufacturing facilities in the United States. EnerDel has asked for \$480 million to expand facilities in Indiana. The Energy Department has received about 75 applications for about \$38 billion in loans while the program is authorized to issue \$25 billion. To meet the needs of the automotive company's projec-

tions, one will essentially need to duplicate the existing world Li-Ion manufacturing capability. Twenty two companies have banded together in a National Alliance for Advanced Transportation Battery Cell Manufacture seeking \$1 billion to \$2 billion in investment over the next five years.

Philips has developed a new mobile phone, the Xenium X520 with excellent battery life. The phone can operate up to 8 hours of talk time and up to a month of standby time on its main rechargeable battery. The phone has a back panel, "Backupower", that adds up to 2.5 hours of talk time, and up to one week of standby time with standard lithium AAA cells. The Z520 has a 2 megapixel camera, stereo Bluetooth (A2DP) support, FM radio with RDS, music player and a microSD memory card slot.

Nissan plans to use Li-Ion batteries in their new hybrid electric cars in 2010. Nissan plans to unveil its new electric car and its original hybrid prototype vehicle in 2010. The Nissan electric car offers zero emissions and features a front-wheel drive powered by advanced laminated compact Li-Ion batteries that are installed under the floor, without sacrificing either cabin or cargo space. The Nissan HEV has a rear-wheel drive system with a parallel-power train hybrid system. The battery automatically turns on if the hybrid electric car is running in idle and shuts off power from the gasoline motor.

Porous Materials, Inc. (PMI) has introduced a new Fuel Cell Porometer that provides fully automated through-pore analysis and includes pore-throat diameter, pore size distribution, mean flow pore diameter, and liquid & gas permeability measurement output. The instrument can measure the effects of compressive stress on a sample, test temperature, sample orientation, layered structure on pore structure characteristics. The Fuel Cell Porometer is designed to measure all the relevant pore structure characteristics of fuel cell components, including the pore distribution of electrodes down to 0.013 microns, a

change in pore size caused by humidity, compressive stress up to 1000 psi, the pore structure of each layer in a multilayer composite, or testing the surface area of through pores for testing reaction rate. Test temperatures can be 200 °C, or more and, in special situations, 800 °C.

The curtain came down on the 2009 Detroit International Auto Show and maybe on the American auto industry as we know it. This might turn out to be a watershed year when some of the industry's big players permanently shift gears from serving ordinary car buyers to serving the grand designs of central planners. The only other time that the industry subordinated its customers to the government was in World War II. Then it had no choice. Today, General Motors, is desperately "retooling" itself to make Washington's environmental and industrial policy priorities a vital part of its business revival plan. By accepting government welfare, GM rejected the chance to transform itself into a worthy competitor to foreign manufacturers. That would have required making too many hard decisions, such as confronting unions, cutting legacy costs, and slashing dealerships under a Chapter 11 filing. Yet, until recently, GM was protesting Washington's green mandates. Vice Chairman Bob Lutz called global warming a "total crock" and declared that hybrids made "no economic sense." This week, asked by a reporter how a cash-strapped company could afford to build a battery factory, Mr. Lutz responded, "We can't, but we're doing it anyway. It's one of the pieces of our future that we absolutely have to do." A recent report by the Boston Consulting Group found that extended-range, all-electric vehicles, like the Volt, will account for no more than 5% of the North American market by 2020 (assuming last year's peak oil prices and \$7,500 in tax credits for electric car buyers). Hybrids, around for almost a decade, today command less than 2% of the market. GM is counting on the government to stay alive. It could potentially recover all of its investment in the new battery facility from a \$335 million state program to bring

green jobs to Michigan and perhaps extract additional funds from the \$825 billion stimulus package that contains \$11 billion for electricity infrastructure needed for the wide-scale adoption of electric cars, as well as \$2 billion in loans to build advanced vehicles and battery systems. (Adapted from a commentary by Ms. Shikha Dalmia, senior analyst at Reason Foundation)

China BAK Battery Co. reported its Fiscal 2009 First Quarter results. Net revenue for the first quarter of FY '09 was \$68.1 million, down 6.4% from last quarter and up 29% from the same quarter of last year. Revenues from cylindrical cells were \$18.4 million, down 6.5% from last quarter and up 615.7% from the same quarter of last year. Market demand from notebook computer manufacturers weakened slightly due to the global financial crisis and recession. Revenues from prismatic cells were \$45.8 million, up 1.7% from last quarter and up 2.1% from the same quarter of last year. Revenues from aluminum-case cells were \$37.3 million, up 3.6% from last quarter and up 24.0% from the same quarter of last year. Revenues from battery packs were \$5.4 million, up 0.2% from last quarter and up 8.1% from the same quarter of last year. Gross profit for the first quarter was \$10.6 million, down 7.7% from last quarter and up 49.1% from the same quarter of last year. Gross margin was 15.6%, compared to 15.8% last quarter and 13.5% in the same quarter of last year. Operating expenses totaled \$9.8 million or 14.4% of revenues in the first quarter, as compared to 11.6% of revenue last quarter and 13.1% of revenue in the same quarter of last year. Net loss was \$1.7 million, as compared to net income of \$1.5 million last quarter, and net loss of \$0.9 million in the same quarter of last year. For fiscal 2009, the company now expects revenue in the range of \$270 million to \$300 million, down from its prior estimate of \$370 million to \$410 million.

Mercedes-Benz has three BlueZERO concept vehicle platforms. Advantages of the modified construction include the positive ef-

fect of the major drive components on the center of gravity, their space-saving design, and the fact that they are extremely well protected within the vehicle underbody. The BlueZERO E-CELL has a battery-electric drive with a 35kWh Li-ion battery which gives a range of up to 200 km. The BlueZERO F-CELL (fuel cell) has a range of 400 km on one tank of hydrogen. The BlueZERO E-CELL PLUS has an electric drive and additional internal combustion engine as power generator (range extender). This version has an overall range of up to 600 km and can cover a distance of up to 100 km using electric drive alone with its 17.5-kWh Li-ion battery. All three BlueZERO variants share the same key electrical components: front-wheel drive and a 100kw permanent-magnet synchronous electric motor that revs to a maximum of 13,280 rpm. Peak torque is 320 Nm and exceeds the figure achieved by a current V6 gasoline engine at 2500 rpm. The BlueZERO E-CELL is a fairly conventional battery electric vehicle which will see production first in the form of the Smart EV.

mPhase Technologies, Inc. has received bids from several companies and is close to selecting a manufacturer to construct the AlwaysReady Reserve Battery that will be used in the AlwaysReady Emergency Flashlight. The AlwaysReady Reserve Battery is a manually activated lithium reserve cell with a minimum storage life prior to activation of 20 years. Once activated, the AlwaysReady will provide equivalent performance to a conventional 3 volt lithium primary battery.

A new report (FUJ00066) from Report-Buyer.com entitled "Worldwide Next-Generation Batteries: Next-Generation Li-Ion Chemistries, Advanced Zinc and Nickel Batteries, Thin-Film and Printed Batteries, and Emerging Alternative Power Sources" is available for £1150 (\$1,642.00). Batteries are a \$63 billion global industry and will be the preferred energy storage solution for a long time to come. This report's primary focus is technologically advanced secondary (rechargeable) batteries in both large and

small format. The report covers advanced technologies as replacements for Ni-Cd and Ni-MH batteries, especially advanced Li-Ion batteries that make use of new electrode materials and electrolytes. It also covers printable batteries and thin-film battery stacks as enablers of micropower applications, and hybrid battery/fuel cell systems that are emerging as complements to consumer electronics batteries. The report includes technologies that have higher power density and higher energy density, are safer, and can be put in new form factors - with the expectation that they can be put into mass production targeting lower costs. The commercial companies, start-ups and universities are all working on new battery designs that rely on new materials and new chemistries.

Altery Systems shipped 1.1 MW of PEM uninterruptible power systems (UPS) in the fourth quarter of 2008. This represents one of the largest shipments of PEM units to date in a single 3-month period. The units were composed of 5 kW, 10 kW and 15 kW UPS units shipped mainly to telecom applications. The units were produced at their automated Folsom production facility. They have been working with Eaton Corporation on installation and service of the units. Altery also has collaboration with Enersys.

The National Alliance for Advanced Transportation Batteries (NAATBat) held its first organizational meeting on January 22, 2009 in Chicago, IL.

Japanese Battery Production Value (Shipping Value Million ¥)	October 2008	Percentage % Based on 2007 Figure	Jan.-Oct. 2008	Percentage % Based on 2007 Figure
Primary Cells (Total)	¥12,113	103	¥106,635	94
Manganese Dry Cells	424	46	4,381	67
Alkaline MnO₂ Cells	5,848	112	48,330	104
AA-Size	3,049	117	24,930	109
AAA-Size	1,291	103	11,067	96
Other Batteries	1,508	114	12,333	103
Silver Oxide Cells	984	130	8,761	97
Lithium Primary Cells	4,625	104	41,756	99
Other Cells	232	46	3,407	37
Rechargeable Batteries (Total)	67,300	108	631,091	118
Lead Storage Batteries (Total)	15,233	87	151,306	122
Automotive Batteries	9,217	86	91,476	128
Bicycle Batteries	684	88	6,730	99
Small Sealed Batteries	881	86	8,945	111
Other Batteries	4,451	95	44,155	117
Ni-Cd and Ni-MH Batteries (Total)	15,034	92	144,318	103
Ni-Cd Cells	2,648	38	32,872	85
Ni-MH Cells	12,127	107	108,866	110
Others (Vented, Pocket Type, etc.)	259	138	2,580	100
Lithium-ion Rechargeable Cells (Total)	37,033	118	335,467	123
Total Battery Production Value	¥79,413	104%	¥737,726	113%