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BIMONTHLY UPDATE

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CONTINUING COVERAGE OF *NANOTECHNOLOGY AND THE BUILT ENVIRONMENT*

There have been number of sector and corporate developments since the release of our base report, *Nanotechnology and the Built Environment: The Transition to Green Infrastructure* (published November 2011). A selection of noteworthy items is included in this updated report. For greater information, please refer to the initial *Nanotechnology and the Built Environment* report, available at www.crystalra.com or from Livingston Securities, LLC by calling (212) 520-8481.

Key sector developments on…

Concrete/Brick ▪ Data and Other Communications Infrastructure ▪ Heating, Ventilation, and Air Conditioning (HVAC) ▪ Insulation ▪ Lighting, Organic Light-emitting Diodes (OLED), and Displays ▪ Smart Paints, Coatings, and Materials ▪ Solar/Building-Integrated Photovoltaics (BIPV) ▪ Structural Steel ▪ Water Treatment ▪ Windows

Company developments from…

A. Schulman, Inc. (SHLM-NASDAQ) ▪ Abakan Inc. (ABKI.PK-OTC) ▪ BASF SE (BASFY-OTC) ▪ Cabot Corp. (CBT-NYSE) ▪ Calgon Carbon Corporation (CCC-NYSE) ▪ Honeywell International Inc. (HON-NYSE) ▪ Johnson Controls, Inc. (JCI-NYSE) ▪ Kraft Foods Inc. (KFT-NYSE) ▪ MiaSolé ▪ Siemens AG (SI-NYSE) ▪ and more…

INNOVATIVE COMPANIES IN THE NANOTECHNOLOGY ARENA MAY BE THE KEY FOR NEW GROWTH AND VALUE IN ESTABLISHED BUILDING SECTORS, AS INVESTMENT IN NANOSCIENCE IS LEADING TO MORE ECOFRIENDLY, ENERGY-EFFICIENT, HIGHER-QUALITY INFRASTRUCTURE.

Recent Sector Developments

Concrete/Cement/Brick

Autoclaved Aerated Concrete (AAC)

A February 2012 article posted on GreenSpec® evaluated autoclaved aerated concrete (AAC), a porous form of concrete that contains no aggregate, simply aluminum powder that reacts with sand or fly ash and is then baked in an autoclave. Despite the energy-intensive autoclaving process, manufacturers report that it takes approximately 50% less energy to produce AAC than standard Portland cement (Source: GreenSpec®, February 1, 2012). Although this nanomaterial is lighter, more fire-resistant, and a better insulator, its use is far more widespread across Europe than in the U.S. Some of the primary barriers to adoption of AAC for U.S. building are the lack of U.S. manufacturers for the product (which creates higher costs) as well as the associated learning curve for builders. AAC requires a more precise mortar application. It is also suitable for only low- and mid-rise construction, such as single-family homes and schools, unless structural reinforcement (e.g., rebar) is added. However, at least two new plants are believed to be coming online in the U.S. over the next several years, which could open up domestic AAC market opportunities.

http://greenspec.buildinggreen.com/content/autoclaved-aerated-concrete-aac-will-us-ever-lighten

Protected Pavers in the UK

UK company, G-Force Steam Ltd, recently completed a repaving project whereby it applied a protective nanocoating to approximately 300,000 new concrete paving stones as part of an ongoing refurbishment. An area spanning 5,000 m^2 was repaved and sealed with the Flexiguard™ water-based, stain-resistant surface technology. Flexiguard™, a clear coating, is believed to be free of damaging solvents yet is durable enough to withstand winter weather conditions as well as run-off and UV rays for at least five years. Use of the sealant is designed to preserve the aesthetics and life of the pavers, and also reduce the frequency at which they must be cleaned.

http://www.shropshirelive.com/2012/01/09/telford-company-cleans-up-with-repaving-project

Data and Other Communications Infrastructure

Alcatel-Lucent Works to Build Products for a Low-Carbon Economy

Nature of Business™ (http://natureofbusiness.fm), a weekly radio show dedicated to business and environment, recently interviewed Rich Goode, director of sustainability at Alcatel-Lucent (ALU-NYSE). Goode has further cofounded the Boston Area Sustainability Group (BASG) with Glenn Grant of G2 Technology Group. At Alcatel-Lucent, he works to reduce the company's carbon footprint, in line with Alcatel-Lucent's belief that society is moving toward a future low-carbon economy with sustainable cities. Alcatel-Lucent is taking the steps now to capitalize on and stay at the forefront of these changes. The company has founded GreenTouch.org, a consortium with the goal of enabling a 1,000-fold improvement in communications networks efficiency by 2015. Desiring the best minds of today, Alcatel-Lucent has opened it to scientists and engineers from academia, customers, and competitors who are collaborating to significantly reduce the carbon footprint of information and communications technology (ICT) devices, platforms, and networks. Alcatel-Lucent is emphasizing the development of technology, products, and services needed to dematerialize and prepare for a low-carbon economy—necessities given anticipated population growth of another three billion people over the next 40 years.

http://natureofbusiness.fm/rich-goode-sustainability-director-alcat

Heating, Ventilation, and Air Conditioning (HVAC)

America's Next Top Energy Innovator Challenge Includes New HVAC Approaches

The U.S. Department of Energy (DOE) has closed voting in the America's Next Top Energy Innovator Challenge, a part of the Startup America initiative. This initiative is geared toward making it easier for start-ups to use inventions and technology developed at the DOE. In addition to votes from America, a panel of experts is also evaluating the companies participating for their potential economic and social impact. Among the innovators is 7AC Technologies, Inc., a Massachusetts company developing liquid desiccant HVAC systems for commercial and industrial buildings using technology from the U.S. National Renewable Energy Laboratory. 7AC's novel HVAC systems, which include a membrane conditioner for drying and cooling air, may offer 50% to 75% reduced energy use versus conventional HVAC units. As well, these systems allow for solar or waste heat sources.

http://energy.gov/science-innovation/innovation/americas-next-top-energy-innovator/americas-next-top-energy-innovator

Insulation

Global Markets for Aerogel Insulation

A recent article from Nanostart AG, a nanotechnology venture capital investment firm, illustrates rising market awareness of energy-efficient insulation techniques. Noting that nearly a fifth of all CO_2 emissions in Germany are due to buildings, with 75% of energy use in German households spent on indoor heating alone, Nanostart AG discusses the opportunities for silica-aerogels at reducing this energy burden by more effectively insulating homes and buildings. Next-generation, nanotechnology-based aerogel insulation delivers enhanced thermal properties in a much thinner, often cost-efficient form factor. The nanoporous structure of today's aerogels, which range from only 2 mm to 10 mm in size from companies like Aspen Aerogels, Inc. (profiled on pages 26-27 of Crystal Research Associates' *Nanotechnology and the Built Environment: The Transition to Green Infrastructure*), minimizes energy transfer by reducing three mechanisms of heat transport: convection, conduction, and radiation. Cabot Corp. (profiled on pages 27-28 of the *Nanotechnology* report) is also a well-known supplier of aerogel. Nanoporous aerogel foams can be applied to conventional insulation that is already installed on building façades or loose-fill aerogel particles can be used as spray insulation or as a filler for vacuum insulation panels. Aerogel also serves as a translucent filler to add insulation between glass panes.

http://www.nanostart.de/index.php/en/nanotechnology/nanotechnology-information/601-nanotechnologie-zum-energieeffizienten-bauen

Lighting/OLED/Displays

High-resolution, Low-power, OLED Microdisplays

On January 27, 2012, closely held MicroOLED (www.microoled.net) debuted a low-power organic light-emitting diode (OLED) that offers 5.4 million pixels in a 0.61-inch microdisplay. The company believes that this ultra-compact product represents the highest pixel density OLED microdisplay available today. While intended for uses such as professional camera and camcorder equipment, night-vision systems, and head-mounted displays used in surgery, this technology may have wide-reaching applications. Its low power requirements allow it to operate on as little as 0.2 W of electrical power with full digital video.

http://www.laserfocusworld.com/articles/2012/01/microoled-unveils-highest-pixel-density-oled-microdisplay.html

Nano Films That Offer Touch Functionality

On January 30, 2012, Cambrios Technologies Corp. (www.cambrios.com) announced that it hired CEO John LeMoncheck and raised $5 million from Samsung Venture Investment. Cambrios creates thin transparent films that conduct electricity. With this nano film, the company can add touch capability to products that have a display, such as phones and televisions. Beyond the consumer electronics sector, such transparent conductors have opportunities in the solar and lighting markets as well. Cambrios believes that its ClearOhm product—a silver-like material that can be sprayed onto a clear film to create a microscopic web of conductive wire—works better than existing indium tin oxide solutions, as it is both conductive and transparent. Typically, there is a trade-off between transparency and conductivity. LeMoncheck is focused on building a sales and marketing structure to sell this technology into multiple industries. Prior to this appointment, LeMoncheck served as CEO of SiBEAM, a provider of wireless networking chips that was sold to Silicon Image for $25 million in 2011.

http://venturebeat.com/2012/01/30/touchscreen-film-maker-cambrios-hires-new-ceo-and-raises-5m/

Striving to Introduce More Efficient, Affordable LED Products

As reported in the *Wall Street Journal* on February 8, 2012, startup company Soraa Inc. (www.soraa.com) believes that it can increase LED through a new manufacturing technology that makes LEDs more efficient and more affordable. Essentially, Soraa believes that it can generate more light from smaller LED chips, thereby only requiring one chip to produce light versus four or more chips as is common in LEDs today (Source: *Wall Street Journal*). As well, the Soraa LED does not require the cooling fans of some comparable LED-based products. The company is initially targeting halogen lamps, such as used in track lighting at retail outlets and other businesses. Commercial sales are scheduled to commence in the second quarter 2012, at a price point of approximately $25 a lamp. Closely held Soraa was founded in 2008 and is led by the inventor of the LED style that is now widely employed, Mr. Shuji Nakamura, as well as by individuals from Intel Corp., Samsung Electronics Co., and Hewlett-Packard Co., among other global electronics companies. Since inception, Soraa has raised more than $100 million.

http://online.wsj.com/article/SB10001424052970204369404577209311114578858.html

Updated Lighting Industry Trends and Information from the DOE was Released in January

In January 2012, the U.S. Department of Energy (DOE) released the *2010 U.S. Lighting Market Characterization* report, which finds that in 2010, lighting accounted for nearly 19% of the electricity produced in the U.S. The commercial sector consumed roughly half of this amount due to fluorescent lighting products. Over the past decade, there has been a noticeable shift toward energy-saving lighting products fueled by investment in more efficient technologies, higher efficiency standards, and public awareness campaigns. As a result, the *2010* report shows that the efficiency of installed lighting increased from 45 lumens per watt in 2001 to 58 lumens per watt in 2010. In parallel, the DOE reports that the U.S. is experiencing increasing demand for light as the number of households rises and as the number of sockets per household rises. From under seven billion stationary light bulbs in 2001, there were more than eight billion in 2012. In addition to trends and statistics, the *2010 U.S. Lighting Market Characterization* details specific products, their performance characteristics, associated energy use, and lumen production across four sectors: residential buildings, commercial buildings, industrial buildings, and outdoor applications.

http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=668

Smart Paints/Coatings/Materials

Nano-based Paint for Early Detection of Potential Structural Failure

Researchers from the University of Strathclyde (Glasgow, Scotland) are developing a nanotechnology-based "smart" paint that can be sprayed onto any surface—such as on wind turbines' concrete foundations, mines, bridges, and buildings—to detect a potential structural failure before it occurs. The paint incorporates wireless sensors that can identify microscopic failures, cracks, or other movements. Prototypes have already been

completed at the University of Strathclyde, where tests to date have shown the paint to be effective (Source: Printed Electronics World, February 2, 2012). Importantly, this nano-coating is designed to be ecofriendly and low cost. In comparison to current safety monitoring processes for assessing large structures, which can be complex, time consuming, require expensive equipment, and rely on a substantial amount of human expertise, the smart paint is estimated to be only a fraction of the cost. As well, it could enable straightforward, 24/7 monitoring of the entirety of a structure. The coating currently in development by researchers in Glasgow is composed of recycled fly ash (a waste byproduct of coal combustion) and carbon nanotubes. The resulting cement-like consistency makes this innovative paint applicable to a wide range of structures, including those in harsh environments.

http://www.printedelectronicsworld.com/articles/smart-paint-could-revolutionise-structural-safety-00004135.asp

New Bulletproof Material Potentially Four Times Stronger than Kevlar®

Among developments in smart materials is a futuristic new tissue that is designed to reinforce human skin cells with spider silk. A spider silk weave is believed to be up to four times stronger than Kevlar® (used to make bulletproof vests), effectively allowing the body to stop projectiles without being pierced. Video at the below link to ASM International (a material science society) illustrates how such bioengineered skin can stop a bullet fired at half speed. While a full-speed bullet was able to penetrate the spider silk skin, the same tests performed with piglet skin, human skin, and human skin fused with regular silkworm silk showed that none of these alternative compositions were able to stop either then half- or full-speed bullet.

http://www.asminternational.org/portal/site/www/NewsItemVideo/?vgnextoid=1c80ef7c74535310VgnVCM100000621e010aRCRD

Research Advancements in Smart Materials, as Presented at an International Conference

Additionally, a new report is now available titled *Smart Materials and Nanotechnology in Engineering*, which comprises 160 papers presented at the 2011 International Conference on Smart Materials and Nanotechnology in Engineering (SMNE2011), held in September 2011 in Wuhan, China.

http://www.researchandmarkets.com/research/8d0af6/smart_materials_an

Nanotech Integrator Discusses Opportunities for Advanced Surface Technologies

UK company NanoLandGlobal Ltd. (www.nanolandglobal.com) seeks to fast track nanotechnology products, working with over 100 nano-specialists and laboratories primarily located across Germany. On February 4, 2012, the company's cofounder, Shiva Balivada, described how essential new nanotech infrastructure can be to helping companies protect their brands and value, reduce operational costs, and adopt more energy-efficient and ethical environmental practices. A focus for NanoLandGlobal is surface coatings that improve upon existing surfaces, such as the following types of next-generation products: self-cleaning coatings, anti-stain coatings, de-polluting surfaces, scratch-resistant coatings, anti-fogging and anti-icing coatings, antimicrobial coatings, UV protection, anti-corrosion coatings, moisture-resistant insulation, abrasion protection coatings, and vibration-noise barriers. Balivada advises companies to evaluate their supply chains to identify the areas where their suppliers are adopting more sustainable practices, and then to follow suit with green technologies in their own businesses.

http://www.nanotech-now.com/columns/?article=618

Solar/Building-Integrated Photovoltaics (BIPV)

Rapidly Expanding Market for CIGS Thin-Film Solar Panels

Many solar cell manufacturers and researchers are primarily focused upon copper-indium-gallium-diselenide (CIGS) thin-film technology, a type of thin-film solar panel made using semiconductor material composed of copper, indium, gallium, and selenium. CIGS typically offers strong sunlight absorption capacity, thus solar cells can be produced with a thin film of CIGS while still achieving full functionality. According to data published in the

January 2012 issue of *Solar Industry*, researchers from Lux Research forecast that the market for CIGS-based solar installations can reach $2.35 billion in 2015—more than double its current size (Source: *Solar Industry* online, January 26, 2012). Much of this growth is due to the following positive trends that occurred during 2011: (1) falling production costs; (2) more efficient solar panels; and (3) a greater use of CIGS solar cells on commercial rooftops. Continuing increases in demand are fueling this market, though greater venture capital funding is required.

There are a number of innovative solar cell manufacturers positioned to capitalize on BIPV growth worldwide, including Solar Frontier, Avancis, and Solibro (as addressed in *Solar Industry* [January 2012]) as well as HelioVolt Corp. and MiaSolé (detailed on pages 39-40 of *Nanotechnology and the Built Environment*).

http://www.solarindustrymag.com/e107_plugins/content/content.php?content.9577

Layoffs at Amonix Inc.

Multiple news reports in January 2012 have announced that California-based Amonix Inc. and its manufacturing partner, Singapore-based Flextronics Industrial, laid off approximately 200 employees (or roughly two-thirds of the workforce) at a Las Vegas production facility (Source: *Solar Industry* online, January 26, 2012). Solar provider Amonix reportedly announced to the *Las Vegas Sun* that the layoffs were temporary due to a retooling of the factory. Officially, Amonix has yet to issue a press release confirming the layoffs.

http://www.solarindustrymag.com/e107_plugins/content/content.php?content.9575

Soltecture and altPOWER Partnership

As the solar industry expands, consolidation and strategic partnerships are expected to have a significant role, with M&A activity in the solar industry likely to continue behind the development of new cost-effective technology (Source: *USA Today's* "Big Companies Aggressively Jump into Clean Tech," 2011). To this extent, in January 2012, Soltecture GmbH, a manufacturer of copper-indium-sulfide (CIS) PV modules in Germany, entered into a partnership with U.S. company altPOWER, Inc. AltPOWER is focused on BIPV installations.

http://www.solarindustrymag.com/e107_plugins/content/content.php?content.9563

U.S. Expansion of BIPV

A January 2012 GreenSpec® article describes differences between the BIPV market in Europe and Asia, where these installations are more common, versus in the U.S., where the technology has reportedly seen slower adoption. Among other factors (such as a lack of suitable new projects due to economic contraction in the U.S. over the past few years), differences in code compliance may also account for greater BIPV uptake overseas. The regulatory processes in Europe to approve custom-built PV panels for use on an architecturally innovative façade are relatively simple. In contrast, PV code compliance in the U.S. requires that any changes made to solar modules (such as for custom BIPV installations) need to be reassessed, with approval for each PV panel size, mounting system, components, etc. This process can become time consuming and costly (Source: GreenSpec®, January 12, 2012).

However, in an effort to simplify the use of BIPV in the U.S., PV codes are being overhauled. Initial modifications are expected by the end of 2012, with a new PV standard that would eliminate the retesting requirement altogether anticipated within the next several years.

http://greenspec.buildinggreen.com/content/building-integrated-pv-new-opportunities-bright-future

Structural Steel

MMFX Expands Market for its "MMFX 2 Rebar" Through Agreements with Cascade Steel

On January 23, 2012, closely held MMFX Technologies Corp., a material science company commercializing proprietary micro and nanotechnologies that improve the mechanical properties of microstructures, announced that it entered into two long-term strategic agreements with Cascade Steel Rolling Mills. Cascade Steel, a wholly owned subsidiary of Schnitzer Steel Industries, Inc. (SCHN-NASDAQ), is a manufacturing partner for MMFX. The companies have extended their 10-year relationship through additional technology license and supply agreements that are anticipated to accelerate growth of the MMFX 2 rebar (concrete-reinforcing steel). The proprietary MMFX 2 steel entails a low-carbon, chromium alloy designed to reduce or eliminate carbides, which are chemicals recognized for their contribution to corrosion in steel. Corrosion test results indicate that MMFX 2 rebar has five times the resistance to corrosion of common rebar steel specifications and performed 1.75 times better than stainless steel, also outperforming epoxy-coated steel reinforcements. This announcement marked the first license for MMFX's micro- and nanotechnology. Financial terms were not disclosed. Greater details of MMFX are provided on pages 46-47 of *Nanotechnology and the Built Environment*.

http://www.marketwatch.com/story/mmfx-inks-technology-license-and-supply-agreements-with-cascade-steel-2012-01-23

Water Treatment

Private Investment Approaches to Repair U.S. Water Infrastructure

The American Society of Civil Engineers rated both U.S. drinking water and wastewater infrastructure a "D-" in its 2009 "Report Card for America's Infrastructure" (the latest year for which data is currently available). The U.S.'s water infrastructure, encompassing collection, holding, treatment, and distribution systems, has been in place for most of the 20th century and is becoming subject to frequent failures. However, the cost to repair these systems is prohibitive, with recent estimates at roughly $365 billion.

On February 1, 2012, the National Resources Defense Council (NRDC) released a report titled *Financing Stormwater Retrofits in Philadelphia and Beyond*, which advises on how local and state governments can stimulate private investment to offset the costs of stormwater infrastructure repair. Among other measures, the report finds that a stormwater fee and credit system, whereby property owners can receive a credit up to a nearly 100% reduction in the fee for retrofitting their own systems using green infrastructure to reduce runoff, provide a vital incentive. It further discusses the innovative financing mechanisms and considerable possibilities for public/private partnerships that can be used to fund such retrofits. In Philadelphia alone, the NRDC estimates a potential for $376 million in private investment, if innovative finance approaches are applied to harness the power of the market.

http://www.nrdc.org/water/stormwater-financing.asp

Nano-based Water Treatment for Oilfields

Texas company Molecular Filtration Inc. is developing a method to reclaim water at oilfields by removing all organic presences, including crude oil, bacteria, and viruses, without using chemicals, ultraviolet light, electro-deposition, or other techniques that alter water's constitution. In addition, by not using a chemical substance, the oil solids captured from the water are unchanged, thus they can be collected and sold to increase the producer's revenue stream. The company has received research help from Rice University and is planning a well site demonstration at the Eagle Ford Shale near San Antonio, Texas. Its units at present have flow rates of 50, 100, and 200 gallons per minute, translating to approximately one, two, and four barrels per minute. The units can be parked on a well site.

http://www.mywesttexas.com/business/oil/article_fdc44e4c-d4c7-56cf-8c3e-26bcce17222d.html

Windows

New Smart Window Product Set to Launch in the Second Quarter

Denver, Colorado-based RavenBrick, LLC is anticipated to launch the RavenWindow to the market in the second quarter 2012. This smart window product automatically adapts to outdoor air temperature in order to reduce the need for heating and cooling. Using clean nanotechnology, the RavenWindow is designed to tint (to reflect light and heat) during warmer weather and become transparent in colder weather to let in the light and heat. The company claims that its RavenWindow can reduce energy bills by over 30%. Products may be eligible for LEED credits as well.

http://www.green-buildings.com/content/782205-ravenwindow-smart-window-ravenbrick

Proving Carbon Nanotubes at the Sub-10-nanometer Scale

On January 18, 2012, researchers from IBM Corp. (IBM-NYSE) published an article in *Nano Letters* demonstrating that, at the sub-10-nanometer level, experimental carbon nanotube transistors can outperform competing silicon technology (Source: *Sub-10 nm Carbon Nanotube Transistor*, January 18, 2012). Transistors, a semiconductor device, switch on and off or amplify an electrical current. Advancements in transistors, which are commonly manufactured using silicon, have enabled consistently less expensive, higher performing, and smaller electronic devices. Nano-transistors have inherent advantages, chiefly, a thin and light structure, reduced power loss, and an ability to work at a range of voltages. Moreover, carbon nanotubes are not only a technologically advanced method of conducting electricity but are also stronger than steel and can emit light (Source: CNET.com, March 23, 2006). Silicon—and potentially one day soon, carbon—transistor nanotechnology enables a number of "smart" products, including smart energy grids, electrochromic and other window technologies, and photovoltaics (solar panels).

Scientists at IBM sought to show that carbon nanotubes could theoretically replace silicon as a semiconductor material. At nine nanometers in size, IBM's carbon transistor is smaller than commercial silicon transistors (e.g., Intel Corp.'s recently announced 22-nanometer silicon Tri-Gate circuits). As of May 2011, Intel's technology roadmap did not anticipate the company's first production of 10-nanometer transistor technology until 2015 (Source: Intel). The carbon nanotube transistors tested by IBM operated at a low voltage and outperformed silicon technology on speed and power. Accordingly, they could enable future development of processors with low power consumption yet more computing power. The authors of *Sub-10 nm Carbon Nanotube Transistor* believe that they proved the viability of nanotubes as a technique to be considered in future "aggressively scaled transistor technologies."

http://pubs.acs.org/doi/abs/10.1021/nl203701g?journalCode=nalefd

Key Company Developments

A. Schulman, Inc. (SHLM-NASDAQ)

At the end of January 2012, A. Schulman entered into an agreement to acquire French company Elian SAS for approximately $63 million in cash—a move anticipated to strengthen A. Schulman's global color masterbatch position. A. Schulman is shifting its product mix away from commodity products to focus on masterbatch, niche engineered plastics, and specialty powders. Masterbatch is a product in which pigments and/or other additives are already dispersed. It serves as a raw material for the main plastic or other product. The transaction with Elian is expected to generate approximately $2.5 million of annual run rate synergies by the end of fiscal 2013. A. Schulman believes that acquiring Elian can significantly improve its product mix in the EMEA region, and plans to continue identifying potential strategic acquisition targets to diversify its end markets and provide long-term growth opportunities. A. Schulman's business is profiled on pages 62-63 of *Nanotechnology and the Built Environment*.

http://ir.aschulman.com/releases.cfm

Abakan Inc. (ABKI.PK-OTC)

Abakan, an acquisition company investing in and providing companies with managerial and intellectual support, holds a 41% interest in Powdermet, Inc., an advanced materials R&D organization, as well as a controlling interest in MesoCoat Inc., a nanomaterials subsidiary of Powdermet focused on metal protection and repair. MesoCoat was recently ranked #50 on Forbes' list of "America's 100 Most Promising Companies." The company has products currently being evaluated by original equipment manufacturers, the U.S. Air Force, U.S. Navy, and Marine Corps, among other entities. While nearing commercialization, none of these products are yet being mass produced.

http://www.forbes.com/promising-companies

On January 23, 2012, Abakan filed its Form 10-Q for the three- and six-month period ended November 30, 2011, during which the company reported revenue of $548,877 and $897,265 for the three and six months of 2011, respectively, versus $0 in both periods of 2010. Revenues in 2011 were attributable to the operations of MesoCoat, which included commercial revenues, contract and grant revenues, and other income.

http://biz.yahoo.com/e/120123/abki.pk10-q.html

BASF SE (BASFY-OTC)

On January 19, 2012, Ecology Coatings, Inc. (ECOC-OTCQB), a developer of nanotechnology-enabled, UV-curable coatings, announced that it entered into a license agreement with BASF Coatings GmbH, which ranks among the world's leading chemical companies. BASF is profiled on pages 14-15 of *Nanotechnology and the Built Environment*. This non-exclusive license agreement gives BASF Coatings the rights to use several of Ecology Coatings' European and U.S. patents in exchange for a 0.5% royalty in Europe on net sales of products using the patents and 2.5% on net sales outside of Europe. These patents pertain to advanced coatings for automotive and industrial metal objects, fiberglass panels, and olefin plastics (e.g., car bumpers). Each proprietary coating technology covered under the patents offers a unique benefit, including an ability to protect metal that has a rubber or plastic part from being damaged by heat, being resistant to sunlight, enabling easy cleaning such as the removal of graffiti from fiberglass panels used in retail locations, and the ability to adhere without use of a primer.

http://www.nanowerk.com/news/newsid=23997.php

Cabot Corp. (CBT-NYSE)

On February 1, 2012, Cabot reported net sales for the first quarter FY 2012 of $762 million, up from $694 million for the first fiscal quarter of 2011—largely driven by a nearly 12% increase in rubber blacks revenue. Sales in Cabot's new business segments, which include inkjet colorants, aerogel, micropowders, and elastomer composites, were $25 million for the three months ended December 31, 2011, versus $24 million for the comparable prior year's term. Cabot reports that its continued focus on margin expansion and value pricing enabled a 15% improvement in adjusted earnings both sequentially and year-over-year despite softer volumes from economic uncertainty, seasonality effects, and customer inventory destocking.

http://investor.cabot-corp.com/phoenix.zhtml?c=94559&p=irol-newsArticle&ID=1655479&highlight

In January 2012, Cabot sold its tantalum business to an Australian miner for approximately $450 million. Tantalum is a strategic metal with uses in electric vehicles, wind turbines, LEDs, cell phones, fiber optics, lasers, hard disks, and numerous defense applications. An initial cash payment of $175 million has been received under this agreement.

http://www.masshightech.com/stories/2012/01/23/daily2-Cabot-completes-450M-sale-of-specialty-metals-unit.html

Calgon Carbon Corporation (CCC-NYSE)

On February 7, 2012, Calgon Carbon announced that it secured conditional acceptance from the California Department of Public Health for its C3500D wastewater disinfection system. This milestone allows the company to sell the C3500D to the California market.

http://www.calgoncarbon.com/news/index.cfm

Honeywell International Inc. (HON-NYSE)

Honeywell, a global manufacturer of technologies for safety, security, and energy (profiled on page 16 of *Nanotechnology and the Built Environment*), filed a lawsuit on February 6, 2012, against Nest Labs, Inc. (www.nest.com). The suit alleges patent infringement of seven of Honeywell's patents related to its thermostat technology that incorporates a range of energy-smart home functions and an identifiable round design. California-based Nest Labs is a maker of smart thermostats sold by Best Buy Co., Inc. The lawsuit seeks to prohibit Nest Labs and Best Buy from using Honeywell's patented technology and to recover damages caused by the infringement.

http://www.marketwatch.com/story/honeywell-files-lawsuit-alleging-patent-infringement-by-nest-labs-follows-similar-litigation-against-other-manufacturers-2012-02-06

Honeywell's lawsuit comes on the heels of similar litigation by Honeywell against other manufacturers (Venstar Inc. and ICM Controls) that are also believed to be infringing on the company's thermostat and combustion controls patents. The number of potentially infringing products for Honeywell's technology is indicative of trends in home energy management: the patents cited in the lawsuit against Nest include functions and features that appear to be in fairly widespread in the industry. Such features entail remotely managing thermostats, home energy data stored online to allow cloud-based controls, "time to temperature" functions that note how long before the house reaches a newly set temperature, and a low-power management approach that involves using power from the home wiring to charge the thermostat battery, as well as Honeywell's round thermostat shape, which Nest's thermostat also uses.

http://www.greentechmedia.com/articles/read/inside-honeywells-lawsuit-against-nest-labs

Separately, in London, Honeywell and utility SSE recently launched a full-scale smart grid project to connect up to 30 commercial and industrial buildings. Using Honeywell's automated demand response technology, SSE plans to work with customers to reduce peak electricity use and reduce strain on the local grid. Ultimately, Honeywell expects that the project can lead to approximately a 10 MW reduction in energy use.

http://www.environmentalleader.com/2012/01/27/smart-grid-briefing-honeywell-constellation-lockheed-martin-retroficiency

Johnson Controls, Inc. (JCI-NYSE)

On January 19, 2012, JCI announced record earnings for its first quarter of fiscal 2012. The company reported a 9% increase in quarter-over-quarter net sales and a 12% increase in income from business segments. In its building efficiency segment specifically, first quarter sales were up 4% over the year-ago period, reaching $3.5 billion. The increase was fueled by greater revenue from Asian markets and JCI's Global Workplace Solutions, offset by decreased sales in Europe and residential HVAC.

http://www.johnsoncontrols.com/publish/us/en/news.html

As well, JCI has reported more building efficiency customer orders for the start of FY 2012 versus the first quarter FY 2011, as well as an 8% increase in backlog with gains across all geographic regions. Among its recent contracts, in January 2012, the Atlanta Housing Authority selected JCI to implement energy-efficiency building upgrades across 13 senior residential care facilities. This contract is a component of Atlanta's larger energy-savings program, which is expected to save nearly $18 million over the next 20 years (Source: JCI). Retrofitting these care facilities to achieve an energy savings and a minimized environmental impact includes installing new HVAC equipment, weatherizing to reduce heat loss, and upgrading bathrooms for water conservation. The energy cost savings generated are anticipated to repay the project capital investment over the term of the contract with JCI.

http://www.johnsoncontrols.com/publish/us/en/news.html?newsitem=http%3A%2F%2Fjohnsoncontrols.mediaroom.com%2Findex.php%3Fs%3D113%26item%3D2790

Additionally, a consortium led by JCI's EnergyConnect business was selected in January 2012 to provide demand response services to reduce up to 100 MW of peak energy use for utility customers in southeastern Pennsylvania. This collaborative project seeks to meet state-mandated load reduction targets.

http://www.smartgridnews.com/artman/publish/Technologies_Demand_Response/Evolution-of-demand-response-Johnson-Controls-led-consortium-embodies-several-trends-4421-page2.html

Kraft Foods Inc. (KFT-NYSE)

Kraft Foods Inc. (KFT-NYSE) announced on February 2, 2012, that, across its 36 manufacturing plants in 13 countries, it no longer sends waste to landfills. Kraft initially sought to reduce waste (more than 99% of which is due to manufacturing activities) by 15% between 2005 and 2011. In 2011, the company set another 15% reduction goal with a target date of 2015. Kraft has well exceeded these goals, with its solid waste today at 50% of 2005 levels. As much as 90% of that waste is then recycled or reused in activities such as creating energy. In addition to waste, Kraft emphasizes improving its environmental responsibility and sustainability in agricultural commodities, packaging, energy, water, and operations related to transportation and distribution.

http://phx.corporate-ir.net/phoenix.zhtml?c=129070&p=irol-newsArticle&ID=1655729

MiaSolé

California-based MiaSolé announced on February 2, 2012, that it reached new CIGS efficiency milestones for thin-film photovoltaic solar panels. Year-over-year, the company has increased more than 30% in efficiency, with its recent 17.3% champion device result. A unit with 14% efficiency is now in production MiaSolé.

http://www.solarindustrymag.com/e107_plugins/content/content.php?content.9618

Siemens AG (SI-NYSE)

An article published January 26, 2012, in *Russia Beyond The Headlines* highlights the difference in R&D spending between the U.S. and Russia, where only 1% of GDP (just over $23 billion) is spent on R&D each year. In contrast, the U.S. consumes approximately 2.7% of GDP, or more than $382 billion, in R&D annually (Source: *Russia Beyond The Headlines*). In a move to increase innovation in Russia, a new city, Skolkovo, is being designed with a full-scale research center capable of supporting scientific development through mass production. Skolkovo seeks to bring together startups, corporate research, major companies, young talent, investors, and inventors. Global companies are already taking note. By 2015, Siemens aims to have 150 employees working in its Skolkovo research center, supported by a $30 million contribution from the Skolkovo Foundation to Siemens' Skolkovo project. Siemens has entered into agreements to contribute another $50 million.

http://rbth.ru/articles/2012/01/26/building_the_engine_of_progress_from_the_idea_up_14254.html

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