Getting Gas to More Places for Less

Natural gas is the fastest growing major energy source in the nation, according to the U.S. Dept. of Energy. Because it is clean burning and competitively priced, natural gas is widely used for electric power generation, residential and commercial heating, and cooling and as a feedstock for products such as plastics and fertilizers. Gas pipelines crisscross much of the U.S. making this fuel available in most urban areas. However, for end-users not near a pipeline, there is a growing need for smaller, less expensive liquefied natural gas (LNG) facilities. Researchers at the Idaho National Laboratory, Idaho Falls, have made this prospect a reality by developing a new LNG-based technology dubbed The Compact High Efficiency Natural Gas Liquefier. This technology does not require as large a production facility, therefore is less expensive to build and operate and produces a lower cost product than existing commercial approaches, including large-scale, centralized processing plants. This new liquefier also boasts a design with only two major moving parts and sophisticated software that allows virtually unattended, low-maintenance operation.

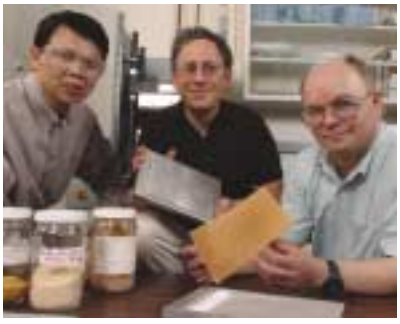
More info: www.inl.gov

Revamping Titanium Production

Titanium boasts a range of attractive properties for both research and industrial applications. It's lustrous and ductile, with the strength of steel but, 43% lighter, twice as strong as aluminum, and more corrosion resistant than stainless steel. Its alloy, NiTi, is one of three known alloys with shape memory, making it an ideal metal for dental braces and eyeglass frames. However, the current method for producing titanium parts involves costly, time-intensive machining.

Fortunately, developers, Eric Nyberg, Kevin Simmons, and K. Scott Weil, from Pacific Northwest National Laboratory, Richland, Wash., have created Ti MIM: a New Technique for Titanium Metal Injection Molding. This process is a quantum leap forward in titanium metallurgy by overcoming barriers of impurity intrusion enabling cost- effective production of titanium parts that is finally on par with steel and stainless steel manufacturing. The process also has the potential to cut raw materials requirements by a third or more.

More info: www.pnl.gov



Better Bioconversion

Nations throughout the world are mandating that biomass products replace fossil fuels in an effort to decrease dependence on foreign re-sources, develop local economic activity, and protect the environment. These are driving forces for the development of integrated biorefineries. In a joint effort, researchers at Argonne National Laboratory, Ill., and Archer Daniels Midland Co., Decatur, Ill., have created the Separative Bioreactor for the Production and Recovery of Biobased Products.

The separative bioreactor combines the advantages of the selectivity and specificity of enzymatic reactions (or fermentations), the technical advantages of heterogeneous catalysis, and the energy efficiency of electrically driven separations with the performance advantages of chromatography into a single-unit operation. Moreover, it reduces the chemical input, and waste output, making it a viable platform for the production and recovery of biobased products, including organic acids.

More info: www.anl.gov

MIST Benefits Foundry Industries

The Metal Infusion Surface Treatment (MIST) is an advanced, low-cost infused coating technology that is applied to finished industrial components resulting in improvement in their life and performance. MIST has been proven applicable to reducing metal-casting die wear and checking, reducing friction coefficients on certain materials, and acting as a host for catalyst ions for high- temperature diesel engine exhaust emissions treatment. This platform is also applicable to both metal and ceramic components and is independent of any coefficient of thermal expansion mismatch issue.

The technology was created by developers from C3 International, LLC, Alpharetta, Ga.; Oak Ridge National Laboratory, Tenn.; Hayes Lemmerz International Inc., Bristol, Ind.; Surface Engineering Associates, Cleveland, Ohio; Infrared Heating Technologies, LLC, Oak Ridge, Tenn.; Magna-Tech Manufacturing, Muncie, Ind.; Advanced Materials Associates, Breckenridge, Colo.; Vitek Performance, Atlanta, Ga.; Pyromation, Inc., Fort Wayne, Ind.; Delaware Tool & Machinery, Muncie, Ind.; Heinz North America, Freemont, Ohio; University of Tennessee, Knoxville; and North American Die Casting Association (NADCA), Wheeling, Ill.

More info: www.cccintl.com

Super Dry Paper

In the paper and pulp industry, certain drying operations have not changed significantly since their development nearly two centuries ago. However, researchers at Argonne National Laboratory, Ill., the Univ. of Illinois at Chicago, and Kadant Johnson, Three Rivers, Mich., have recently developed a revolutionary concept that offers a radically new approach to this process.

The Multiport Dryer Technology for the Forest Products Industry has been designed to increase paper drying efficiency by more than 50% than that of conventional paper dryers. Additional savings are realized as the new technology is being introduced as a retrofit, which avoids the high costs of installing new equipment. It is estimated that this technology has the potential to increase paper production rates up to 50%, and save up to 16.6 trillion Btu/yr by 2030.

As well as earning an *R&D 100* award, the dryer has also been recognized by the U.S. Dept. of Energy with a Best Project award.

More info:www.anl.gov

Cost-effective Aluminum Production

The domestic aluminum industry is at a juncture where the replacement of 10- to 25-year-old melting hardware is required. The high price of fuel also necessitates the adoption of an energy efficient melting process, as energy costs constitute more than 50% of the cost to process molten aluminum.

Answering this call, researchers at Apogee Technologies, Verona, Pa., and Aleris International – Aleris Rolled Products, Uhrichsville, Ohio, have created the Isothermal Melting Process (ITM). The ITM is an advanced high-performance aluminum melting process, with dramatically reduced energy consumption. Moreover, the process produces no in-plant emissions, and uses less floor space. Specifically, this process operates at a melting energy requirement of 552 BTU/lb A1, (industry average: more than 1,800 BTU/lb A1), melt loss less than 1%, and requires one-third the floor space of a conventional aluminum melter.

Analysis has indicated that the ITM process can provide an annual cost savings of more than $300 million, based only on energy savings alone.

More info: www.apogeetech.com

Introducing Nanofermentation

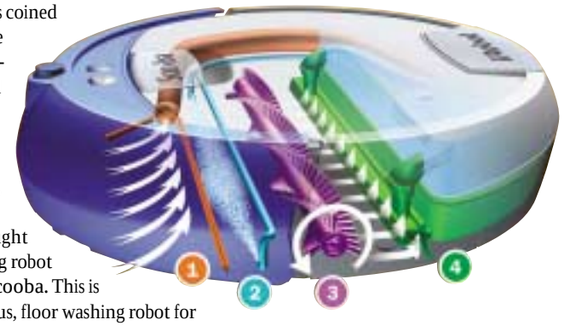
The first fundamentally new approach for making nanoscale ceramic materials in more than 50 years has been developed by researchers at Oak Ridge National Laborarory, Tenn. NanoFermentation: A Bioprocess for Manufacturing Inorganic Nanomaterials, is the first system to use industrial bioprocessing methods to manufacture nanometer-scale, inorganic engineering materials rather than organic compounds.

It harnesses the natural metabolic processes of metal-reducing bacteria to create tailored single-crystal nanoparticles of important engineering materials, particularly ferrites. It is a low-cost, environmentally benign process and can synthesize materials for applications such as magnetic media, ferrofluids, xerographic toner, catalysts, pigments, water treatment, and coatings.

This process is easily scaled to large quantities and is adaptable to standard industrial fermentation practices.

More info: www.ornl.gov

Finally…a Robot to Wash the Floor



Since the word robot was coined eight decades ago, people have been asking the age-old question, "When will there be a robot that washes my floors for me?" The answer is now. Developers from iRobot, Burlington, Mass., the same company that brought the world the vacuuming robot Roomba, now present Scooba. This is the first fully autonomous, floor washing robot for home use. The small, 10-cm-high device simultaneously preps, washes, scrubs, and dries hard floors in one pass (although the robot will usually pass over the same area more than once.)

Scooba's motions are guided using iRobot's AWARE Robot Intelligence System which is used to calculate the best path to clean the floor using techniques, such as spiraling, wall following, and room crossing. It cleans around carpets and furniture and detects steps and drop-offs so it will not travel over an edge. Scooba can clean up to 19m^2 of floor with a full tank of water making its total weight 5 kg. Once it finishes its cleaning cycle, Scooba turns on an internal dry mode, that removes any liquid remaining on its brushes and inside parts, preparing it for storage.

More info: www.irobot.com