DSM CONTINUES PORTFOLIO SHIFT

LIFE SCIENCES: Dutch firm strikes deals in nutrition, antibiotics

DSM

A view of DSM's antibiotics plant in Delft, the Netherlands.

THE DUTCH specialty chemicals company DSM closed out 2010 with two transactions intended to sharpen its focus on the life and materials sciences. It struck a deal to acquire U.S.-based Martek Biosciences for $1.1 billion, and it agreed to sell half of its anti-infectives business to China's Sinochem for about $275 million.

The announcements came just days after DSM signed an agreement to sell its elastomers business to Lanxess. That sale, for more than $400 million, completed a four-year program to exit commodity businesses in fertilizers, melamine, citric acid, and benzoic acid. Total proceeds will come in at about $1.6 billion, DSM says.

Columbia, Md.-based Martek produces polyunsaturated fatty acids—a family of nutritional supplements—via algal fermentation. Its flagship product, docosahexaenoic acid, is added to almost all major brands of infant formula, as well as to foods, beverages, and dietary supplements. Martek's fiscal 2010 sales were $450 million, up 30% over the previous year.

In addition to fast growth, Martek brings an algal technology platform that complements DSM's own expertise in yeast fermentation, enzymes, and advanced chemistry. In fact, Martek's number two product, the fatty acid arachidonic acid, is manufactured under contract by DSM via fungal fermentation.

Formation of an Asian anti-infectives joint venture, meanwhile, is a long-held goal of the Dutch company, which is one of just a few remaining Western producers of penicillin. DSM had held sporadic talks with North China Pharmaceutical Group about such a venture since 2004 but finally abandoned them in 2009.

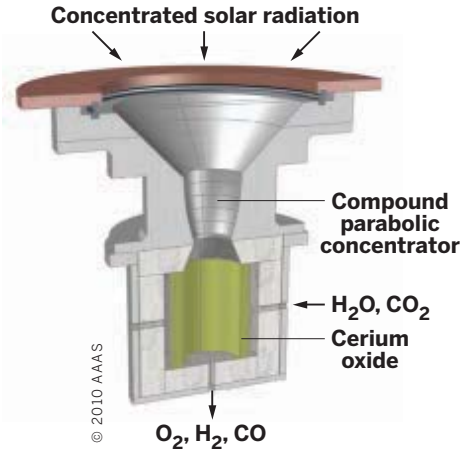
Under the new deal, Sinochem becomes half owner of a business with $425 million in annual sales and about 2,000 employees. In a presentation to investors, DSM executives said they believe Sinochem's position as one of China's biggest state-owned enterprises will help expand the business to more than $750 million in sales by 2015.

"Anti-infectives has been a problem child for years," observed Andreas Heine, a stock analyst with UniCredit, in a note to investors. "The agreed move with Sinochem seems to be a very good solution."—MICHAEL MCCOY

SOLAR FUEL, WITH HIGH EFFICIENCY

RENEWABLE ENERGY: Continuous cerium oxide-based syngas generator suggests possible industrial use

Concentrated solar radiation enters the reactor, is intensified by a compound parabolic concentrator, and is focused on a cerium oxide cylinder. H_2O and CO_2 enter side inlets, and O_2, H_2, and CO exit a bottom outlet.



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RESEARCHERS have developed a novel thermochemical reactor that uses sunlight to convert carbon dioxide and water into hydrocarbon-fuel precursors at a relatively high efficiency.

The feat is a key step toward using solar energy to produce much-needed liquid fuels more efficiently than may be possible with alternative methods, such as photocatalysis or microbial fermentation-based hydrocarbon-fuel production.

The new thermochemical reactor is believed to be more efficient than previously developed ones, whose efficiencies could not be comparably measured. And it is amenable to continuous operation, suggesting that an industrial-scale version of the process could be developed for solar towers.

The reactor was designed by solar technology specialist Aldo Steinfeld of ETH, the Swiss Federal Institute of Technology, Zurich; materials scientist Sossina M. Haile of California Institute of Technology; and coworkers (*Science*, DOI: 10.1126/science.1197834). It uses concentrated solar energy to thermochemically dissociate CO_2 and H_2O via cerium oxide redox reactions to produce CO and H_2, respectively, with O_2 as a by-product. CO and H_2 form syngas, which can be processed to generate methanol, gasoline, and other liquid fuels.

The reactor's solar-to-syngas energy conversion efficiency, experimentally measured with a 2-kW prototype, is 0.7 to 0.8%, which Steinfeld says is significantly higher than those of current photocatalytic methods for CO_2 dissociation. A thermodynamic analysis indicates that efficiencies of 16% or more are achievable with the new reactor.

The study's "solar conversion efficiencies are less than 1%, but these efficiencies set an important benchmark for further improvements in the use of pure solar thermal energy to split CO_2," notes renewable energy researcher Stuart Licht of George Washington University.

The novelty is the experiment's relatively large scale, "the number of cycles demonstrated, and performing the demonstration long enough and in such a reproducible and controlled way that the efficiency can be carefully determined," says thermochemistry specialist James E. Miller of Sandia National Laboratories. "It's a step toward demonstrating what's possible for a technology that has been underappreciated and deserves more attention."—STU BORMAN