

# Innovation@Heraeus

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## Innovations key to worldwide success

- **Annual Press Conference 2008: Close cooperation with customers moves innovations forward**

With 25 development centers and more than 4,700 patents and patent applications, Heraeus demonstrates its innovative strength worldwide. In fiscal year 2007, the Group filed 97 new patent applications. The innovation rate (this refers to revenues from products that are less than three years old) held steady at more than 20%. "Innovations are the engine driving our business and an important pillar of our growth strategy. They should open new market segments and generate new technologies for our companies," said Dr. Frank Heinrich, Vice Chairman of the Board of Management of Heraeus Holding GmbH, underscoring the Group's innovation strategy at the press conference at the end of April 2008 on the 2007 annual results.

A number of factors contribute to the successful development of new products and innovations. For example, research and development at Heraeus is not concentrated in a central location. "Given our broad product portfolio and the variety of industrial markets we supply, it only makes

sense to decentralize our R&D. This keeps each business segment close to its markets as it generates new products and solutions to meet its customers' needs," Dr. Heinrich noted. International and interdisciplinary cooperative ventures and partnerships with universities and research institutes, such as Northeastern University in Shenyang, China, help Heraeus discover new ideas and meet country-specific customer requirements.

Long-term cooperation with customers paves the way for new products. "A good example is our work with the optics company Carl Zeiss SMT," Heinrich pointed out. "Built on a strong foundation of trust, our customer-supplier relationship promotes innovative developments in microlithography. As a certified Carl Zeiss SMT Supply Chain Partner, we work closely with Carl Zeiss to continually improve the optical properties and qualities of synthetic quartz glass." The latest innovation in this field is a durable, self-repairing generation of quartz glass for microlithography lens systems used in manufacturing microchips. In its lifetime as a wafer in stepper optics, for example, fused silica must withstand more than 200 billion laser pulses

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without damage. Suprasil® 501 meets these specifications. The reason: Hydrogen molecules present in the glass can repair laser-induced defect centers that would otherwise degrade its outstanding optical properties.



*Photo 1: Suprasil® 501 - a durable, self-repairing generation of quartz glass for microlithography lens systems used in manufacturing microchips*

As a market and technology leader with core competences in precious metals, sensors, dental and medical products, quartz glass, and specialty infrared and ultraviolet lighting sources, Heraeus focuses its development programs on new growth markets, such as health, communications, and the environment—and it aims to generate new services as well as innovative products. In the dental industry, dental prosthesis increasingly depends on CAD/CAM technology. With its new state-of-the-art CAD/CAM production center in Hanau, Heraeus offers a complete line of services for dental technologists. Crowns, bridges, dental implants and more, made of ceramics such as zirconium dioxide, can be manufactured on an individual and just-in-time basis.

The market is growing by leaps and bounds. “With the latest technology and a well-thought-out overall process, Heraeus broke this market wide open,” said Dr. Heinrich.

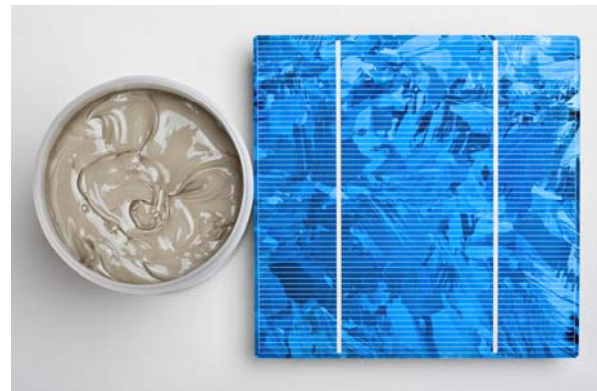


*Photo 2: Digital dental prosthetics – complete line of services for dental technologists*

### **Innovations for the environment and photovoltaics**

Since 1916, Heraeus has manufactured catalysts that are industry classics—platinum and platinum-alloy gauzes, as much as six meters in diameter, used in the combustion of ammonia to produce nitric acid. Their catalytic effect has been steadily improved in recent decades. Now, an innovative combination of these gauzes with a secondary catalyst made of ceramic carriers charged with precious metals has contributed significantly to environmental protection. One by-product of ammonia combustion is nitrous oxide—a gas with 310 times the atmospheric greenhouse effect of carbon dioxide. The new catalyst system destroys as much as 90% of the nitrous oxide.

The environmentally friendly photovoltaics market is booming these days. Numerous Heraeus products, from infrared emitters to sputtering targets, play a part in the production of solar cells. These are now made primarily of silicon-based wafer modules. An alternative concept uses thin-layer modules that are 100 times thinner than crystalline solar cells made of silicon wafers. For both concepts, Heraeus develops products used for coatings, integrated circuits and heat technology. In addition to sputtering targets, these include silver-containing pastes that allow the solar current to flow from the silicon cells with minimal shading loss. Infrared heat is also used in the production of solar cells, as coatings are applied to the carrier materials in a vacuum at high temperatures. Heraeus has developed new emitters for the photovoltaics industry, with a reflector of opaque quartz glass that can be used to stabilize and optimize heating processes used in the manufacture of solar cells.



*Photo 3: Silver-containing pastes allow the solar current to flow from the silicon cells with minimal shading loss*

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## Extending the shelf life of foodstuffs: Disinfection of packaging with UV specialty lamps

In the manufacture, processing, filling and packaging of foodstuffs, hygiene and sterility are an absolute must. Food manufacturers are increasingly choosing disinfection with ultraviolet light as a cost-effective and environmentally friendly alternative to conventional chemical processes. Short-wave UV-C radiation, in particular, has an intensive bactericidal effect. Microorganisms such as viruses, bacteria and fungal spores are destroyed by UV radiation in a matter of seconds.

Already in use worldwide, UV disinfection modules from Heraeus Noblelight can be installed into existing filling machinery for dairy and beverage products. BlueLight UV disinfection modules are custom-built for the treatment of packaging and surfaces. Various shapes and sizes of containers for dairy products, as well as lids, sealing and packaging foils can be disinfected with UV radiation. UV disinfection inactivates up to 99.99% of total germs without slowing the machinery. The UV modules are also suitable for combination treatment with UV and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). The powerful systems produce cold UV radiation, disinfecting packaging material without heat. The compact design makes it easy to retrofit BlueLight UV disinfection modules into existing plants. Heraeus offers UV disinfection modules in a range of sizes that can be adapted to suit the particular application.



*Photo 4: BlueLight disinfection modules facilitate the rapid and safe disinfection of packaging materials and surfaces in the food industry*

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## HERAEUS INSIDE

### technology report 2008 published

How innovative catalysts in the fertilizer industry aid in environmental protection, ultraviolet lamps ensure clean drinking water, sensors improve steel production or tiny electrodes restore a regular heartbeat—information on all of these subjects can be found in the inaugural issue of **technology report 2008**, published by the Heraeus precious metals and technology group. Offering a combination of intriguing reading material and technical information, the magazine invites readers with an interest in technology to explore the wide range of innovative products manufactured by the family-owned company. Heraeus' precious metals, such as platinum, its temperature sensors, dental and medical products, quartz glass and specialty lighting sources are found in virtually every industrial sector—whether it is the chemical industry, steel production, medicine, the automotive industry, semiconductors, electronics, telecommunications or the aerospace industry. The articles in **technology report 2008** highlight the broad range of business activities and technological expertise offered by this globally active company.



The magazine is intended for a wide readership, including customers, universities, institutions, students in the natural and materials sciences and technology networks. Available in German, English and Chinese, **technology report 2008** can be ordered free of charge by logging on to <http://technologyreport.heraeus.com> or sending an e-mail to [technologyreport@heraeus.com](mailto:technologyreport@heraeus.com).