

Press Release

Hanau, Germany, November 16, 2011

Heraeus Innovation Awards 2011: Revolutionary temperature measurement with optical fibers named top innovation

- **Best Process Innovation: Efficient method for producing quartz glass tubes for silicon wafers**

At the ninth annual Heraeus Innovation Awards, presented in Hanau in mid-November, first prizes were awarded to a new temperature measurement device for the aluminum industry and an efficient process for manufacturing large quartz glass tubes for silicon wafers. The winner of the product innovation award was Jan Cuypers, a Developer in the sensors business group (Heraeus Electro-Nite), who revolutionized measurement technology with FiberLance™, which directly and precisely measures molten media temperatures in industrial furnaces used for aluminum manufacturing. Quartz glass fibers connected to light detecting sensors are used for temperature measurement instead of industry-standard thermocouples and pyrometers. Michael Hahn, Production Manager at Heraeus Quarzglas, won the award for process innovation thanks to a low-cost, flexible, globally standardized manufacturing process for large-diameter quartz glass tubes. These tubes are stable at high temperatures in process chambers and are used in the production of silicon wafers (300-mm wafer technology) for microchips and to manufacture solar cells.

The runner-up in product innovation was Dr. Stephan Kirchmeyer of Heraeus Precious Metals, who succeeded in creating the first invisible electrical functional coatings on flexible touch screens, for example for smartphones, with an innovative combination of conductive polymers (Clevios) and recently developed etching technology. Nicole Gübler, a Developer at Heraeus Materials Technology, took third place in product innovations with a ceramic protective layer for sealing platinum components in the glass industry.

The Innovation Award has recognized excellence since 2003

The prizewinners were honored by Dr. Frank Heinrich, Chairman of the Heraeus Holding Board of Management, and Jan Rinnert, Vice Chairman of the Heraeus Holding Board of Management, at a ceremony in Hanau. "Heraeus has been successfully writing industrial history for 160 years, with both product and process innovations. There are people behind these innovations: our colleagues in research, development, application technology, and engineering. Your innovations are essential to our success," said Dr. Frank Heinrich, thanking the winners.

The Heraeus Innovation Award was launched in 2003. All Heraeus researchers and developers worldwide are eligible to participate. More than

190 product innovations have been submitted since 2003, and a total of 29 products and processes have been honored. This year, 21 projects were in the running. "Our Innovation Awards recognize top performance that contributes to the company's success and have a motivating effect. The developers can be very proud of their innovations," emphasized Dr. Tanja Eckardt, Head of Innovation Management at Heraeus.

Best Product Innovation: Revolutionary temperature measurement – Glass fibers conquer the aluminum bath

Aluminum is favored the world over as a light metal by the automotive, aircraft, and packaging industries. Precise temperature control is essential to its manufacture. Fast, accurate temperature measurement of the aluminum bath (electrolysis), means a more energy efficient manufacturing process. Heraeus Electro-Nite Developer Jan Cuypers and his team have come up with a true innovation in measurement technology. Instead of utilizing industry-standard thermocouples, the sensor experts offer temperature measurement with optical fibers.

FiberLance™ was developed to directly and precisely measure bath temperatures in industrial furnaces for primary aluminum manufacturing. The measurement system uses new technology: an optical fiber connected to a light detecting sensor. The quartz glass optical fiber is consumed during measurement, but since it is supplied in 100 m lengths on a plastic drum, companies can perform up to 10,000 bath temperature measurements without recalibrating the device. The new measurement technology is enabling the sensor specialists at Heraeus to enter new territory. "Optical fibers are new for us, but expanding into this area is a logical complement to our temperature sensor products for the steel industry. We collaborated with a British research institute, and also internally with the specialty fibers group at Heraeus Quarzglas," said Jan Cuypers, enthusiastic about the award.

Best Process Innovation: A cost-effective process for manufacturing large-diameter quartz glass tubes for the semiconductor industry

The ultrapure high-tech material quartz glass has become indispensable in the production of optical fibers for the telecommunications industry, semiconductors, and solar cells for photovoltaics. Microchips are made from silicon wafers with a diameter of 300 millimeters. Large-diameter quartz glass tubes play a key role in manufacturing these wafers. These tubes are stable at high temperatures and are needed for numerous steps performed in process chambers. Thanks to a process innovation by Michael Hahn and an international team of developers, Heraeus Quarzglas can manufacture large-diameter quartz glass tubes for 300-mm wafer technology even more cost effectively and efficiently. "With this unique, flexible process and globally standardized reshaping processes, we have considerably reduced the process steps compared to the previous

procedure. This innovation allows us to make even larger tubes for the next generation of silicon wafers, which are based on 450-mm technology," emphasizes Production Manager Michael Hahn.

Product innovation – second place:

Clevios – organic electronics for touch screens

Under the brand name Clevios™, Heraeus produces conductive polymers that take the form of bluish dispersions; they form electrical functional coatings and are finding more and more areas of application in our daily lives. Flexible touch screens for smartphones and tablet PCs represent one new, extremely promising use. These intuitive user interfaces are based on innovative microelectronics on thin films with conductive coatings. With a combination of various conductive polymers and a newly developed etching technology, Dr. Stephan Kirchmeyer, Head of the Functional Coatings Business Unit, and a team of developers from the Heraeus Conductive Polymer Division have succeeded in making these functional films on touchscreens completely invisible to the human eye.

Modern touch screen technology requires specific structuring of the surface into conductive and nonconductive areas. The etching technology developed now replaces mechanical structuring by deactivating the conductivity without removing the polymer. This results in conductive structures that are completely invisible to the eye. "This invention is a breakthrough for us in the use of our conductive polymers," according to Stephan Kirchmeyer. "Now no one sees the color differences. Due to these new structuring possibilities, increasing numbers of touch screen manufacturers are interested in our conductive polymers."

Product innovation – third place: innovative platinum protection system lowers cost of manufacturing special glass

Because of their chemical resistance and high melting points, platinum and its alloys are used as a component material in the glass industry during the melting and manufacture of special glass (such as display panels) at high temperatures above 1400°C. The hotter the molten glass, the more efficiently high-quality glass can be refined and produced. The bad news: At the high temperatures used, platinum reacts with oxygen to form platinum oxides and evaporates from the surface of components. The higher the working temperature, the greater the evaporation rate, and the faster the component will be damaged and ultimately destroyed.

Nicole Gübler, Developer at Heraeus Materials Technology, described the challenge: "The customer wanted us to develop a platinum component that could be used at 1650°C for up to 8,000 hours without major boil-off losses. "She and her team developed an innovative ceramic layer that is applied like a second skin to seal the platinum component. This protective covering significantly inhibits the evaporation of platinum as platinum oxide and

allows for a working temperature of 1650°C. Components in the worldwide glass industry contain more than 100 tons of platinum. This innovation helps reduce the processing and thus manufacturing costs for special glass while saving valuable resources.

Heraeus, the precious metals and technology Group headquartered in Hanau, Germany, is a global, private company with 160 years of tradition. Our fields of competence include precious metals, materials and technologies; sensors; biomaterials; and medical products, as well as dental products, quartz glass, and specialty light sources. With product revenues of €4.1 billion and precious metals trading revenues of €17.9 billion, as well as more than 12,900 employees in over 120 subsidiaries worldwide, Heraeus holds a leading position in its global markets.

For additional information, please contact:

Dr. Jörg Wetterau
Corporate Communications
Head of Technology Media & Innovation
Heraeus Holding GmbH
Heraeusstraße 12-14
63450 Hanau, Germany
Tel. +49 (0) 6181.35-5706
Fax + 49 (0) 6181.35-4242
E-mail: Joerg.wetterau@heraeus.com
www.heraeus.com