Press release

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Innovation Awards 2013: Double victory for Heraeus Quarzglas - A new laser material and a cost-saving process are the winners

- Heraeus presented its 11th annual internal Innovation Awards
- Best Product Innovation: World-record high-power fiber lasers made possible with quartz glass material

Heraeus presented its 11th annual Innovation Awards for the best product and process innovations at a festive ceremony in Hanau in late November. The winners included Dr. Andreas Langner and Dörte Schönfeld from the Heraeus Quarzglas business group. Andreas Langner won in the Best Product Innovation category for developing a new type of quartz glass material for high-performance fiber lasers. It has applications including laser welding in the automotive industry. This innovative core material can be used to build multi-kilowatt fiber lasers that generate more than five kilowatts of laser power from a single fiber – the current world record. Dörte Schönfeld won for Best Process Innovation with a new cost- and material-saving process for manufacturing high-quality lens material from quartz glass, which is needed to produce microchips. Second prize in the Product Innovation category went to Mark Challingsworth (Heraeus Precious Metals, USA) for the Celcion® thick-film material system. It allows light-emitting diodes (LEDs) to glow more intensely for a longer period of time than before, by significantly lowering the heat generated on the LED carrier materials. Third place was awarded to Jan Cuypers (Heraeus Electro-Nite, Belgium) for developing the QuiK-Spec® sensor system for the steel industry, which performs the fastest chemical analysis to date, directly in molten metals.

"Heraeus specializes in innovations"

Award winners were recognized at a ceremony by Supervisory Board Chairman Dr. Jürgen Heraeus and the Heraeus Board of Management, CEO Jan Rinnert and COO Rolf Najork. "Heraeus has been specializing in innovations for more than 160 years. We depend on product innovations that add value for our customers. Innovation is vitally important to us, forming an important cornerstone for our future," said Jan Rinnert, Heraeus Holding CEO, emphasizing the importance of the internal competition and praising the 20 projects submitted by Heraeus developers.

All Heraeus researchers and developers worldwide are eligible to apply for the award, which has been presented every year since 2003. More than 230 product innovations have been submitted since the first competition, and a total of 38 products and processes have been honored. "Innovation is more than just developing new products. It also means improving their quality and manufacturing them at predictable costs. That's why innovation

is inextricably linked to ongoing improvement and optimization of production processes," stressed Rolf Najork, member of the Heraeus Holding GmbH Board of Management.

The winning product and process innovations:

Best Product Innovation:
A novel rare earth doped fused silica for high power fiber lasers
(Dr. Andreas Langner, Heraeus Quarzglas)
High-power fiber lasers are indispensable in material processing and industrial manufacturing technology. Fiber lasers are, for example, utilized in the automotive industry for cutting, welding and drilling metal sheets several millimeters thick. Intensive research is being carried out around the world to improve the laser systems and their performance. Dr. Andreas Langner and a group of researchers at the Institute of Photonic Technology (IPHT) in Jena achieved a breakthrough in the development of an innovative core material for laser fibers. This new process makes it possible to build multi-kilowatt fiber lasers (extra-large-mode-area lasers, or XLMA) that generate more than five kilowatts of laser power from a single glass fiber for the first time ever. Our project partner Laserline achieved this world record using a Heraeus laser fiber and have brought the high-power fiber laser to market. Until now, such high-performance fiber laser systems were only possible through the very complex, expensive and fault-prone combination of multiple individual fibers. "In the new process, we use several steps to manufacture high-purity fused silica granulates, which are subsequently processed into rods and then into laser fibers. This new process was developed as part of a German Ministry of Education and Research (BMBF) project, and enables new, complex fiber laser designs with large laser-active core volumes. No other material in the world compares," explains Dr. Andreas Langner.

Product Innovation, Second Place:
Celcion® – Heat Management System for LED
(Mark Challingsworth, Heraeus Precious Metals)
The Celcion® thick-film material system developed by Mark Challingsworth and his team allows light-emitting diodes (LEDs) to glow more intensely for a longer period of time than before by significantly lowering the heat generated on the LED carrier materials. Celcion® was developed for building circuits directly on aluminum substrates. Assembling LEDs with the innovative material system is more economical than previous processes using metal core printed circuit boards. Because of their good heat conductivity, Celcion®-based LEDs have either a longer life or greater light output. The Celcion® system enables a selective assembly process in which paste is applied only where necessary. This leads to fewer

processing steps and reduces material consumption. Because Celcion® circuits run about 10°C cooler, they last longer at the same light intensity. This also means that the light intensity can be increased by 20% with the same surface area (or circuit size) at the same temperature. This, in turn, can lower production costs.

Product Innovation, Third Place:
QuiK-Spec® (Jan Cuypers, Heraeus Electro-Nite)
Jan Cuypers developed QuiK-Spec®, a sensor measuring system for the steel industry that conducts chemical analyses of significant, sometimes unwanted, substances directly during smelting – faster than ever. The system allows steel producers to measure temperature as well as oxygen content, manganese, phosphorus, sulfur, and carbon in less than a minute, avoiding time-consuming detours through a chemistry lab. The system combines a sensor with a sampler and a spectrometer robot (QuiK-Lab®), which immediately tests the sample. This accelerates and increases steel production, because it eliminates the need of waiting for results from the lab. At the same time, it improves the manufacturing process, since the important information about the composition of the steel is immediately available. Steel expert Jan Cuypers had already won Best Product Innovation in 2011, for developing a measurement system for the aluminum industry.

Best Process Innovation:
Near net shape lens blank for microlithography
(Dörte Schönfeld, Heraeus Quarzglas)
Various photo masks are used in microlithography to project the structures of highly complex integrated microchip circuits with widths of just nanometers onto silicon wafers. Lens systems made of bubble-free, laser-resistant fused silica reproduce these minute chip structures in sharp detail. Until just a few years ago, lens blanks for microlithography were exclusively coplanar disks. Customers then ground away considerable amounts of the highly valuable quartz glass when producing the final lens shape. Dörte Schönfeld's new process minimizes this sophisticated and time-consuming process step for the user and developed therefore the necessary measurement. "Our innovation finally makes it possible to manufacture lens blanks with near-final contours, while also measuring their characteristics," says Dörte Schönfeld, proudly remarking on the process optimization. The blanks are made from quartz glass, which is preformed into the general shape of the lens. The lens blank then goes through several mechanical processing steps and heat treatment, emerging with near-final contours. Blanks with near-final contours offer customers added value by saving money and eliminating several processing steps.

Heraeus, the precious metals and technology group headquartered in Hanau, Germany, is a global, private company with more than 160 years of tradition. Our fields of competence include precious metals, materials and technologies, sensors, biomaterials and medical products, quartz glass, and specialty light sources. In the financial year 2012 Heraeus generated product revenues of €4.2 billion and precious metal trading revenues of €16 billion. With more than 12,200 employees in over 100 subsidiaries worldwide, Heraeus holds a leading position in its global markets.

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