

## Press release

Hanau, November 8, 2018

### **Heraeus boosts quality in 3D printing of highly conductive copper – new fields of application in electromobility, mobile communications and consumer electronics**

**In additive manufacturing of highly conductive copper components, Heraeus achieves 99.8 percent density and approx. 95 percent conductivity IACS using standard powder bed laser melting machines. With this development, the technology group is opening up new industrial fields of application for the manufacturing process of components used in mobile communication devices, consumer electronics and electromobility. Sourcing replacement parts is reduced from several months to a few days.**

Heraeus Additive Manufacturing has overcome the technical obstacles in the additive manufacturing of highly conductive copper components and has optimized the material and the process on a standard printer. The material and manufacturing specialist produces components with 99.8 percent density of solid copper and conductivity of about 95 percent IACS (International Annealed Copper Standard). Around 85 percent IACS is customary in the market. "With this boost in quality, additive manufacturing of highly conductive copper components is now possible, worthwhile and cost-efficient in many industrial sectors," emphasizes Tobias Caspari, Head of Heraeus Additive Manufacturing. His developers deliver reproducible high-quality components and are setting standards in spare parts procurement, which is reduced from several months to a few days.

Examples of applications include components in the areas of electric drives, inductive heating, thermal management and other applications that utilize the excellent electrical and thermal characteristics of copper. In conventional manufacturing processes, manufacturing tolerances are often too high to achieve reproducibility in particularly sensitive manufacturing processes – for example, in the case of products for sophisticated cooling elements or laser transmission. "We've solved this problem as well. We're now working on further increasing the conductivity of micro-alloyed copper and applying our findings to other standard machines." Customization is necessary because the machines from different manufacturers behave differently. The quality of the component is determined by the material, the process and the printing system.

The challenge for the material and process developer: Copper has high conductivity and ductility, but reflects the laser wavelength that is used in standard machines almost like a mirror. At the same time, the high thermal conductivity of copper causes quick dissipation of the coupled energy. This results in a very narrow process window. Conventional 3D printing of pure copper is impossible because of these characteristics. So far, one approach to solving this problem has consisted of using various copper alloys – in each case at the expense of conductivity and other characteristics like resistance to corrosion. Another approach to solving this problem has been to modify the manufacturing process, which involves compromises in the component's quality. For example, the component will exhibit greater porosity if the laser beam only begins to melt the material but does not melt it completely. A third approach to

solving this problem consists of using other laser sources. A commercial implementation of this approach does not exist yet.

At Formnext 2018, Heraeus will present its new development and show highly conductive 3D-printed copper components. The material and process specialist will show additional technological highlights that are relevant for the fields of mobility, electronics, robotics, hydraulics, medicine and aerospace. The focus will be on additive manufacturing with special materials from the set of amorphous metals, refractory metals, precious metals, and alloys for lightweight construction, such as Scalmalloy.

### **Heraeus at Formnext 2018**

November 13 – 16, 2018

Frankfurt/Main

Hall 3.1, Booth D 58

### **More Information**

[Metal powder for additive manufacturing](#)

#### **About Heraeus Additive Manufacturing**

The Additive Manufacturing division of Heraeus, the technology group based in Hanau, develops and validates special metals and the corresponding 3D printing processes. With its combined expertise in materials, production processes and print technologies, Heraeus ensures the highest possible process reliability and efficiency at the customer. To ensure this, it has experts in design, simulation and process development, a technical center for printing, powder manufacturing equipment, and opportunities for powder recycling.

#### **About Heraeus**

A globally leading technology group, Heraeus is headquartered in Hanau, Germany. Founded in 1851, it is a family-owned portfolio company which traces its roots back to a pharmacy opened by the family in 1660. Today, Heraeus combines businesses in the environmental, energy, electronics, health, mobility and industrial applications sectors. In the 2017 financial year, Heraeus generated revenues of € 21.8 billion. With approximately 13.000 employees in 40 countries, the FORTUNE Global 500-listed company holds a leading position in its global markets. Heraeus is one of the top 10 family-owned companies in Germany. With technical expertise, a commitment to excellence, a focus on innovation and entrepreneurial leadership, we are constantly striving to improve our performance. We create high-quality solutions for our clients and strengthen their long-term competitiveness by combining unique material expertise with leadership in technology

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