

Press release

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New technique for miniaturizing medical implants expands treatment options

CerMet technology from Heraeus is revolutionizing medical technology and enabling new treatment options for people with damaged eyesight and neurological diseases

It sounds like science fiction, but in a few years CerMet technology from Heraeus could make an important contribution to the miniaturization of medical implants used in the heart (pacemakers), brain (brain readers), eye (ocular prostheses) or ear (hearing aids). This will make it possible to develop new applications for use in minimally invasive surgery to treat medical conditions, particularly in the area of nerve and brain stimulation. With its innovative, bio-compatible material system made of ceramic and metal (CerMet), Heraeus is helping to significantly increase the quality of life of those affected by these conditions. New treatments require a higher level of integration of the electronics that are used and thus more electrical channels in the feedthroughs. With the CerMet technology, the size of the electrical interface of the implant that will be inserted can be reduced significantly while simultaneously integrating considerably more channels and feedthroughs.

“Medical implants that can be manufactured using the CerMet technology are smaller, more powerful and can integrate more functions – which is a huge advantage for our customers,” says Jens Tröttschel, Vice President Advanced Technologies at Heraeus Medical Components. This is possible thanks to small-scaled conductive paths with a diameter of only 0.15 millimeters – as fine as a piece of paper. More than three million medical devices are already implanted each year to help manage such chronic conditions as cardiac arrhythmia, Parkinson’s, hearing loss or blindness. The new technology opens up new markets for manufacturers of implants and for Heraeus as a supplier, as smarter and more multifunctional devices will help reduce healthcare costs.

CerMet opens up new opportunities for those with visual impairments

CerMet received the Heraeus Innovation Award 2015 for the best product innovation. The strong, high-density and extremely robust CerMet material is a combination of tiny platinum and aluminum oxide particles. Ceramic and metal normally do not bond chemically. This presented the Heraeus team with major challenges during the development of the composite material. The high level of material and system expertise at Heraeus was the key to success.

Previously, individual wires had to be inserted in the ceramic manually and then soldered in a high-temperature process that was labor-intensive and time-consuming. However, when many electrical channels are needed, this process quickly reaches its limit and becomes a hurdle in the development of miniaturized devices and new treatments. “With CerMet, it is possible to have 800 electrical channels per square centimeter, which is a major increase over the number that can be added to current implants,” explains Ulrich Hausch, project manager at Heraeus Medical Components. As a

result, in the future it might be possible, for example, to implant sensors for those with damaged eyesight exactly where they are needed, which will allow for much more efficient treatment. In the case of ocular prostheses (retina implants), more connector channels for conveying impulses from the implant to the optic nerve could lead to better resolution in the retina. Currently, there are typically 64 channels, which allow patients to make out objects dimly. With CerMet technology, more than 1,000 channels can be placed on the same amount of space, increasing resolution dramatically.

And Ulrich Hausch highlights another advantage: "CerMet offers developers and manufacturers of implants greater flexibility in designing new components because the material system enables the production of more complex three-dimensional structures." In the area of feedthroughs, it will now be possible to manufacture angled or branched circuit paths, allowing for more design flexibility than ever before. Active medical implants and devices are often still quite large, for example, brain readers that will control prostheses by capturing brain activity. Quadriplegic patients and amputees, in particular, will benefit greatly from these devices. In order to develop devices for everyday use, the brain readers and their feedthroughs will have to become smaller and the interface between the implant and the body must offer a higher level of integration. In future this will be possible with CerMet technology from Heraeus.

Heraeus, the technology group headquartered in Hanau, Germany, is a leading international family-owned company formed in 1851. With expertise, a focus on innovations, operational excellence and an entrepreneurial leadership, we strive to continuously improve our business performance. We create high-quality solutions for our clients and strengthen their competitiveness in the long term by combining material expertise with technological know-how. Our ideas are focused on themes such as the environment, energy, health, mobility and industrial applications. Our portfolio ranges from components to coordinated material systems which are used in a wide variety of industries, including the steel, electronics, chemical, automotive and telecommunications industries. In the 2014 financial year, Heraeus generated product revenues of €3.4 bn and precious metal revenues of €12.2bn euros. With around 12,600 employees worldwide in more than 100 subsidiaries in 38 countries, Heraeus holds a leading position in its global markets.

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Captions for CerMet technology

1_CerMet

CerMet technology from Heraeus could make an important contribution to the miniaturization of medical implants used in the heart, brain, eye or ear. This will make it possible to develop new applications for use in minimally invasive surgery to treat medical conditions, particularly in the area of nerve and brain stimulation.

2_CerMet Integration

The strong, high-density and extremely robust CerMet material is a combination of tiny platinum and aluminum oxide particles. With the CerMet technology, the size of the electrical interface of the implant with the body can be reduced significantly. At the same time, a considerably higher number of channels or conducting paths can be integrated.

3_CerMet High Count

Thanks to the innovative Heraeus material system made of ceramic and platinum (CerMet), smaller, more robust and more advanced electrical feedthroughs from the implant to the body can be produced. This is possible thanks to small-scaled conductive paths with a diameter of only 0.15 millimeters – as fine as a piece of paper.

4_CerMet _Innovation Award

Best Heraeus Product Innovation 2015: Dr. Robert Dittmer, Jens Trötzschel and Ulrich Hausch (from the left) from Heraeus Medical Components convinced the jury at the Heraeus Innovation Award 2015 with the CerMet technology.