

Literature references

- A. Mauerer, B. Lange, GH Welsch, F. Heidenau, W. Adler, R. Forst, RH, Release of Cu²⁺ from a copper-filled TiO₂ coating in a rabbit model for total knee arthroplasty, *J Mater Sci Mater Med.* 25 (2014) 813-821
- R. Tsaryk, K. Peters, RE Unger, M. Feldmann, B. Hoffmann, F. Heidenau, CJ. Kirkpatrick, Improving cytocompatibility of Co28Cr6Mo by TiO₂ coating: gene expression study in human endothelial cells, *J R Soc Interface.* 86 (2013) 20130428
- M. Haenle, A. Fritsche, C. Zietz, R. Bader, F. Heidenau, W. Mittelmeier, H. Gollwitzer, An extended spectrum bactericidal titanium dioxide (TiO₂) coating for metallic implants: in vitro effectiveness against 5 MRSA and mechanical properties, *J Mater Sci Mater Med.* 22 (2011) 381-387
- Andreas Fritsche, Frank Heidenau, Hans-Georg Neumann, Wolfram Mittelmeier and Rainer Bader, Mechanical Properties of Anti-Infectious, Bio-Active and Wear Resistant Ceramic Implant Surface Coatings, *Key Engineering Materials* 396-398 (2009) 357-360.
- S. Winter, D. Velten, F. Aubertin, B. Hoffmann, F. Heidenau, G. Ziegler, Sol-Gel coatings, *Interface Influence of Materials and Surface Modifications*, In: J. Breme, J. C. Kirkpatrick, R. Thull: *Metallic Biomaterial Interfaces*, Wiley, Weinheim, 2007, 51-64.
- F. Heidenau, W. Mittelmeier, R. Detsch, M. Haenle, F. Stenzel, G. Ziegler, H. Gollwitzer, A novel antibacterial titania coating: Metal ion toxicity and in vitro surface colonization, *J. Mater. Sci.: Mater. Med.* 16 (2005) 883-888.



BioCer

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biocompatibel - effective

BioCer

New Impulses for Implants by Coatings

At BioCer Entwicklungs-GmbH our interdisciplinary team combines its broad knowledge and experience to build up innovative ideas for medical technologies. Therefore, we cooperate with renowned scientists and physician to create and realize new concepts for specific modifications of implant surfaces with sophisticated ceramic coatings. By applying coatings

with a thickness of only a few nanometers we generate biocompatible, anti-allergic, osteoconductive or antibacterial properties or even combinations thereof. The concepts offers new opportunities for therapies and improve the safety for patients and surgeon.

Sol-Gel-Technique

The coatings are based on the principle of the sol-gel-technique. A cost-efficient dip- or spray-coating process is carried out via a solution of organic solvents and organometallic compounds. During subsequent drying, a polymer-like layer is formed

on the material. This layer is converted by thermal treatment into a ceramic layer. The functional modification is obtained by the coating material itself or the homogeneous incorporation of active fillers into the coating solution.

SeptoCer™

Antibacterial
Implant Coating

OsteoCer™

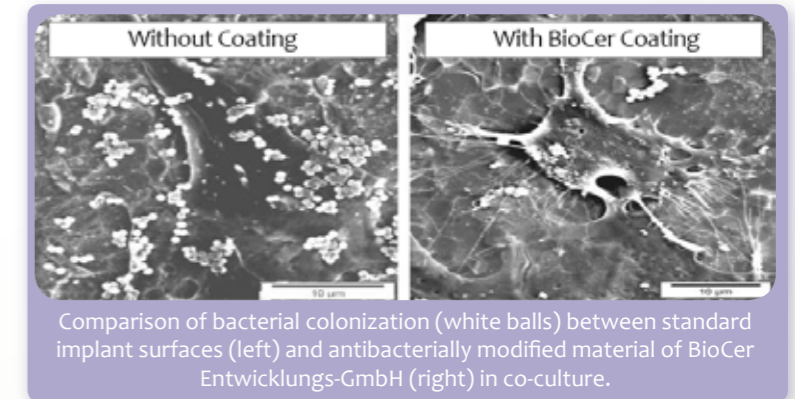
Osteoconductive
Coating

TiOCer™

Anti-Allergic
Implant Coating

SeptoCer™

Despite its antibacterial effect, **SeptoCer™** provides a high biocompatibility and encourages an improved ingrowth behavior. The coating is functionalized by metal ions. By release of these ions into the body, an antibacterial effect is generated. **SeptoCer™** is also effective against formation of bacterial biofilm. Therefore the risk of a late loosening of implants is widely reduced.



A zirconium dental implant with an osteoconductive (bone growth promoting) coating - OsteoCer™ from BioCer Entwicklungs-GmbH (The presented materials are demonstrators only)

OsteoCer™

OsteoCer™ coating system is designed for ceramic implant materials but also for all kinds of implant alloys that are commonly in orthopedic surgery. The implant surface is masked by the improved biocompatible titanium oxide, which is an advantage in many fields of medical applications. At the same time, incorporated calcium ions are released to achieve faster bone ingrowth.

TiOCer™

TiOCer™ is a ceramic like titanium oxide coating, which reduces the leaching of metal ions – like cobalt or chrome – out of the implant surfaces. Currently, the **TiOCer™** coating is in use to improve the biocompatibility of the **TiO₂Mesh™** surgical mesh implants produced and distributed by BioCer Entwicklungs-GmbH, Germany.



Implant samples coated with anti-bacterial and/or anti-allergic **TiOCer™** - compared to a human femur (The presented materials are demonstrators only).

Titanium-oxide coating
The coating with titanium oxide improves the integration of implant materials into the human body.