



**ORCHID**

## Development of a new ceramic coating for medical Titanium implants with the help of Synchrotron CT and Diffraction

Joint implants are commonly made from metals such as cobalt-chrome alloys, because of the stability these materials offer. Yet they can also trigger allergic reactions, which cause problems that can ultimately lead to the loss of the implant. Titanium implants, already in use in

dentistry, are a viable alternative for joint implants due to their high biocompatibility and mechanical strength. However, when subjected to constant movement, as is the case with knee, shoulder or elbow joints, untreated titanium surfaces are too susceptible to strong abrasion.

Orchid Orthopaedics Switzerland GmbH (Baden-Dättwil) is an international leader for orthopedic medical devices. Orchid is currently developing a robust ceramic coating to protect titanium implants against wear. The goal is to apply a ceramic coating to titanium implants using the plasma spray method, a procedure in which the biocompatible powder mixture is heated and then sprayed onto the implant. The rapid cooling leads to the formation of metastable phases on the surface, affecting the implant's coating hardness and resistance to wear abrasion.



The applied material analytics of ANAXAM using the synchrotron radiation help Orchid Orthopedics to optimize their production and

develop a procedure for the postprocessing of the new Titanium implants. On the one hand Synchrotron CT is used to investigate the micro and nanostructure of the coating. On the other hand Synchrotron Diffraction helps to explore the conditions under which the metastable layers are formed, and how they can subsequently be removed or stabilized.

The analytical services of ANAXAM are part of the Nano Argovia project Promucola financed by the Swiss Nanoscience Institute, an interdisciplinary collaboration with the School of



Life Sciences at the FHNW Murttenz and the company Orchid Orthopedics Switzerland GmbH.

“ The analytical service of ANAXAM offer a unique possibility compared to lab-based X-ray investigations, in order to develop a robust ceramic surface for titanium implants that protects them against wear “

Roger Burger, General Manager,  
– Orchid Orthopedics Switzerland GmbH

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