



PRÄZISIONSDENTALTECHNIK GmbH



TIZIO HYBRID IMPLANTS



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medical implant solutions



# HYTIMOX

**Connection of oxide ceramics with novel titanium alloys using  
glass solder technology to generate hybrid implants**

Project duration: 01.07.2020 - 30.06.2023

Project volume: € 2,266,400

Funding by the German Ministry of Education and Research (BMBF) was limited to 10 companies, of which ZM Praezisionsdentaltechnik GmbH, with its subsidiaries Dental Creativ Management GmbH & Tizio Hybrid Implants GmbH, was the only medical device manufacturer. Without the DCMhotbond products and their worldwide unique glass technology the project would not have been feasible.





## Project Description – HYTIMOX

**State of the art:** Common implant materials have individual advantages and disadvantages:

- Ceramics: high abrasion resistance and compressive strength, but no direct bone attachment and risk of brittle fracture;
- Titanium and titanium alloys: good bone attachment, little abrasion resistance;
- CoCr alloys: Higher abrasion resistance than Ti, but toxic effects of Cr and Co particles and ions causing inflammatory reactions;
- Glass solder technology: novel technique for connecting ceramics and titanium → combination of individual advantages and avoidance of disadvantages, but high standard deviation of bending strength due to manual application of glass solder

The aim of the **HYTIMOX** project was to connect **oxide ceramics** and metals (titanium alloys), using a **cohesive glass solder**, into a hybrid material that can be used to generate **implants** for the **musculoskeletal system**.

The **general feasibility** of the investigated hybrid technology for geometries and sizes typical for **endoprosthetic applications** could be **demonstrated** during the project. As a **tangible result**, hybrid prototypes of a **simplified mono-condylar knee prosthesis** were generated and **successfully tested** in a dynamic simulator.



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