

# **Poliklinik für Zahnärztliche Prothetik**

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## **Improved bond strength between metal alloys, glass fiber-reinforced materials and composites in dentistry using electron beam irradiation**

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Many restorations in dentistry are unthinkable without a reliable bond between alloys respectively glass fiber-reinforced frameworks to composites. Years ago, mechanical retention was the only solution. Now-a-days, a chemical link can be achieved. Different systems are available. There are tribochemical or flame-pyrolytical systems that cover the surface with a coat of silicate. Other systems use carbon or phosphoric acids which bond to the oxides of the metal or glass surface. However, it was shown that results of shear bond tests were considerably affected by thermal cycling or long-term water storage. They demonstrated that water can attack successfully the bond alloy/resin (fiber/resin) in the long term.

Therefore, an improvement of the bond alloy/resin respectively fiber/resin is needed for clinical use. Our study investigated the influence of post-curing using electron beam irradiation on the alloy respectively glass fiber to resin bond strength after thermal-cycling in order to find a procedure that makes the bond more reliable. A silicoating system (Rocatec) and functional monomer systems were investigated on Cobalt-Chromium-, Titanium-, and two glass fiber-reinforced systems. First results demonstrated that electron beam irradiation can considerably improve the bond strength between alloys or glass fiber frameworks to resins. This investigation was supported by the High Tech Offensive of the State of Bavaria and FORMAT.