

Title: Oxide layers for applications in dentistry and implantology

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We tested the oxides of transition metals for their anti-bacterial activity and biocompatibility with osteo-cells. Based on these investigations we have selected zirconium dioxide, hafnium dioxide and titanium dioxide, obtained by Atomic layer Deposition (ALD) technology, as the most promising coating materials. Our technology enables conformal deposition of amorphous ZrO_2 , HfO_2 layers, well adhering to the substrate and tightly separating the implant material from the biological environment. We studied the development of bone marrow stromal cells in contact with the ALD layers and observed different behavior of such cells in relation to different oxides. Since ZrO_2 is already used in dentistry, Ti tooth implant coating with ZrO_2 is the most likely the first application of our technology.

The most promising results we obtained for HfO_2 coating – patent application (Polish patent application No: 433753).