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Biphasic calcium phosphates/tantalum pentoxide hybrid layer and its effects on corrosion resistance and biocompatibility of titanium surface for orthopedic implant applications

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Prime Novelty Statement

This paper outlines a novel approach to the formation of a biphasic calcium phosphates (BCPs)/tantalum pentoxide (Ta_2O_5) hybrid layer with satisfactory adherence on Ti surface, combining a simple hydrolysis-condensation process with rapid electrochemical cathodic deposition. The BCPs/Ta_2O_5 hybrid layer was shown to increase the corrosion resistance of Ti surface due to the presence of inner Ta_2O_5 and outer BCPs layers, and resulted in Ti surface with superior hydrophilicity, bioactivity and bone cell adhesion due to the presence of bioactive outer BCPs layer. These characteristics make the proposed BCPs/Ta_2O_5 hybrid layer ideal for potential orthopedic implant applications.