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**Formation of strontium-substituted hydroxyapatite coatings on bulk Ti and TiN-coated  
substrates by plasma electrolytic oxidation**

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**Abstract**

Crystalline strontium-substituted hydroxyapatite (Sr-HAp) coatings with porous structures were directly produced on bulk Ti and TiN-coated substrates by plasma electrolytic oxidation (PEO). PEO was conducted in the electrolytes consisting of 0.4 M  $\text{Ca}(\text{CH}_3\text{OOH})_2 \cdot \text{H}_2\text{O}$  and 0.2 M  $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$  mixed with various concentrations of  $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$  ranging from 0–0.1M at 350 V for 15 min on bulk Ti. The relative integrated peak intensity, hydrophilicity, and cell viability of obtained Sr-HAp coatings firstly increased and then decreased with increasing the  $\text{Sr}^{2+}$  content. This indicates that optimum Sr addition could enhance both the growth and cell viability of the PEO-produced Sr-HAp coatings. Subsequently, the optimum Sr addition [0.05 M  $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ ] was employed to make Sr-HAp coatings on TiN-coated substrates. The Sr-HAp coatings with fine porous morphology were obtained. Moreover, average growth rate of the coatings over TiN/Si was much higher than that on bulk Ti. The

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