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X. Rao, ¡!–[INS][C. L.]–¿C.L.¡!–[/INS]–¿ Chu, Q. Sun

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Synthesis of porous Ce-doped titania coating containing $CaTiO_3$ by MAO and its apatite inducing ability

X. Rao, C. L. Chu*, Q. Sun

School of Materials Science and Engineering and Jiangsu Key Laboratory for Advanced Metallic Materials, Southeast University, Nanjing, 211189, China

Abstract

Bioactive porous $CaTiO_3$-contained titania coatings doped with cerium were prepared on CP-Ti surfaces by micro arc oxidation (MAO) process. The surface morphologies, chemical composition, wettability and the phase compositions of coatings were investigated by scanning electron microscopy (SEM), energy dispersion X-ray spectrometry (EDS), contact angle goniometer and X-ray diffraction (XRD), respectively. The results showed the surface phase compositions of the as-synthesized coatings are anatase, rutile TiO_2 and perovskite $CaTiO_3$ phases, as well as a few amorphous phases. The participation of Ce in the electrolyte during MAO is evidenced to benefit in crystallizing $CaTiO_3$ phase and enhancing the coating surface hydrophilicity. The results of simulated body fluid (SBF) immersion experiments indicate that the hydrolysis of $CaTiO_3$ during immersion could enhance the nucleation and growth of apatite. In comparison, the porous Ce-doped titania coating containing $CaTiO_3$ exhibits better bioactivity as more apatites were observed at the same immersion duration.

Keywords: Porous titania coating; $CaTiO_3$; Ce-doped; Micro arc oxidation; Bioactivity