Microstructure and Properties of ZrO₂ Alloyed Layer on Ti-6Al-4V

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In this paper, the uniform and dense Zr alloyed layer was prepared on Ti-6Al-4V (TC4) alloy by double glow plasma surface alloying technology, and subsequently the Zr alloyed layer was oxidized by MP-CVD technology to form a uniform and dense ZrO₂ alloyed layer. The purpose is to improve the corrosion resistance and wear resistance of TC4 alloy. To evaluate the wear performance of the ZrO₂ alloyed layer, the specimens were measured by wear scars profile curves and friction coefficient curve in human simulated saliva. Then, the open circuit potential method and the potentiodynamic polarization method were used to determine the corrosion performance of the ZrO₂ alloyed layer in human simulated saliva. Finally, the surface and cross section morphology and phase composition of the zirconium oxide coating were analyzed. The results indicate that the ZrO₂ alloyed layer exhibits striking low friction coefficient, very narrow wear scar profile and high self-corrosion current, showing the excellent wear resistance and corrosion resistance.

Keywords: Ti-6Al-4V; ZrO₂ alloyed layer; Wear resistance; Corrosion resistance

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