Effect of Three Different Electrolyte Additives on Corrosion Resistance of Micro-arc Oxidation Coating of NiTi Alloy in Simulated Body Fluid

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In this paper, a micro-arc oxidation (MAO) coating was formed on NiTi alloy in a 0.2 mol/L NaAlO₂ base electrolyte with three additives of 0.03 mol/L NaOH, 0.03 mol/L NaH₂PO₂ and 0.03 mol/L Na₃PO₄, respectively. The influence of different additives on the surface morphology and corrosion resistance of the MAO coatings was systematically investigated. The result revealed that a relatively flat MAO ceramic coating with a typical MAO porous morphology was presented in the electrolyte with NaH₂PO₂. The coating showed the best corrosion resistance which was verified by the smallest corrosion current density after polarization test, indicating that NaH₂PO₂ was an ideal additive. On the base of the above results, MAO-NaH₂PO₂ coating was mainly studied. The section morphology indicated that the MAO-NaH₂PO₂ coating was composed of the dense inner layer and loose outer layer, with a thickness of 5.4 μm. XRD showed that the MAO-NaH₂PO₂ coating was mainly composed of Al₂O₃. It was also proved that the wear resistance of the MAO-NaH₂PO₂ coating had been improved.

Keywords: NiTi alloy; micro-arc oxidation; corrosion resistance; wear resistance

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