Effect of rare earth Y_2O_3 on the corrosion and friction properties of Al_2O_3 ceramic coatings prepared via microarc oxidation

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Rare earth Y_2O_3/Al_2O_3 ceramic coatings were prepared on 6063 aluminum alloy via micro-arc oxidation. The corrosion and friction properties of the substrates were enhanced. Scanning electron microscopy results showed that the number of “crater” holes increased and decreased, and the diameter of micropores first increased and decreased. X-ray diffraction results indicated that the coatings mainly consisted of $\alpha-Al_2O_3$, $\gamma-Al_2O_3$, and Y_2O_3 . The Y_2O_3 contents gradually increased with the increase in Y_2O_3 concentration. The surface roughness of the coatings first increased to 3.231 μm and decreased to 2.404 μm , whereas the thickness increased from 17.8 μm to 22 μm with the increase in Y_2O_3 concentration. Results showed that the surface hardness improved to 596.9 Hv, and the corrosion current decreased to $1.133e^{-008}$ A at Y_2O_3 concentration of 3 g/L. The friction coefficient decreased to 0.42 at Y_2O_3 concentration of 2 g/L.

Keywords: microarc oxidation, yttrium oxide, corrosion property, friction property

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