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Effect of voltage on micro arc oxidation of 6061-Al alloy

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The ceramic film on 6061-Al alloy was prepared by micro arc oxidation (MAO). Effect of voltage on the microstructure and corrosion resistance of MAO coatings were studied by scanning electron microscopy (SEM), X-ray diffraction (XRD), electrochemistry impedance spectroscopy (EIS) and a coating thickness tester. The results showed that the surface morphology of MAO coating on 6061 aluminum alloys is porous volcano-like microstructures. The ceramic coatings are mainly composed with the phase of γ - Al_2O_3 and slight α - Al_2O_3 . Mullite phase ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$) appears when the value of voltage is 500V. With the voltage increasing, the coating thickness and the size of discharge channels increased. The micro cracks will appear at 500V. However, the number of discharge channels and corrosion resistance increased at first and then decreased with the increasing of voltage. Accordingly, when the value of voltage is 450V, the corrosion resistance of the coating showed enhanced properties.

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