Fabrication of WO₃/Al₂O₃ Composite Ceramic Coatings on 6063 Aluminum Alloy by Ultrasound-enhanced Micro-Arc Oxidation

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WO₃/Al₂O₃ composite ceramic coatings were prepared through ultrasound-enhanced MAO technique on 6063 aluminum substrates. The hardness and corrosion performance of the substrate were improved. The diameter of micropores on the surface of the coatings decreased with increasing Na₂WO₃ concentration. X-ray diffraction results showed the coatings consisted of γ-Al₂O₃, α-Al₂O₃, and WO₃. The amounts of γ-Al₂O₃ and WO₃ increased with increasing Na₂WO₃ concentration. The roughness decreased from 2.00 μm to 1.67 μm. The corrosion current density reduced from 32.59 μA/cm² to 0.29 μA/cm², and the hardness increased from 1025HV to 1465HV. The vibration amplitude of the electrolyte increased with increasing ultrasonic power and reached 144 μm at 700W, which changed the microstructure of the coatings.

Keywords: Ultrasound enhanced micro-arc oxidation, ceramic coatings, corrosion performance

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