Cerium Doped Trimethoxy Silane-Aluminium Isopropoxide Coatings for Enhanced Corrosion Protection of 1061 Aluminum Alloy in Aqueous Sodium Chloride Solution

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Aluminum alloy is the most widely used light metal material in recent years, and the corrosion resistance of aluminum alloy is currently a research hotspot in the field of materials. In this work, the purpose of using $\text{Ce}(\text{NO}_3)_3$ doped trimethoxy silane-aluminium isopropoxide (GPTMS-AIP) coating is to improve the corrosion resistance of aluminum alloy. SEM, EDS and Fourier transform infrared spectroscopy (FT-IR) were used to analyze the microscopic morphology and composition of the coating, and the potentiodynamic polarization measurements and electrochemical impedance method were used to investigate the influence of the content on the corrosion resistance of the coating and the corrosion behavior of the coating. The results showed that when the addition amount of $\text{Ce}(\text{NO}_3)_3$ was 0.5 g/L, the coating was homogeneous and flat with fewer defects. The corrosion behavior analysis proves that Ce^{3+} in the coating is released to generate $\text{Ce}(\text{OH})_3$ and CeO_2 , which can repair the coating and make coating have a certain self-repairing effect.

Keywords: corrosion resistance, self-repairing, composite coating, rare-earth salts

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