Electrochemical Corrosion Behaviour of Nano Aluminium - Polytetrafluoroethylene Pigment Modified Water borne Epoxy Coating on Carbon Steel

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For fasteners, corrosion causes rust on the threads, reduces their strength and making their disassembly difficult. The protective coating of fasteners needs to have excellent anti-corrosion and lubricating properties. In this paper, nano Aluminium (nano-Al) and Polytetrafluoroethylene (PTFE) particles were used to fabricate a nano Al-PTFE epoxy self-stratifying structure coating. The SEM, AFM, and DSC results show that the coating formed a self-stratifying structure when it is pre-dried at 110°C and then dried at 200°C. PTFE is located on the surface of the coating to enhance lubricity, while nano-Al is located at the bottom of the coating to enhance corrosion resistance. Moreover, Electrochemical impedance spectroscopy (EIS) shows that the C_{dl} of the nano Al-PTFE modified coating with an artificial defect is lower, while its R_{ct} is higher than that of the other two coatings, indicating that corrosive electrochemical activity only occurred in a small area of the coating. The SVET results indicate that the distance of the nano Al-PTFE modified coating from the defect edge contour only changed a little after 48 h of immersion. In conclusion, the coating has good anti-corrosion performance.

Keywords: Corrosion behaviour; Nano Al-PTFE; Self-stratifying; EIS; SVET

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