Preparation of double linked waterborne epoxy resin coating using Titanium curing agent and aminopropyltriethoxysilane and its anticorrosive properties

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doi:10.20964/2021.07.07

Received: 20 June 2020 / Accepted: 11 March 2021 / Published: 31 May 2021

To obtain a waterborne coating with excellent anticorrosion performance, a titanium ion-containing curing agent and polysiloxane were used separately and together to cure epoxy resin coatings. Fourier transform infrared (FTIR) spectroscopy was employed to investigate the curing process. An immersion test in NaCl solution was performed, and then, the morphology changes of different coatings were observed by field emission scanning electron microscopy (FESEM). Electrochemical impedance spectroscopy (EIS) and copper-accelerated acetic acid salt spray (CASS) testing were conducted to characterize the corrosion resistance of the coatings. The FTIR spectra showed that when both agents were used, the curing process of the resin involved three stages, which resulted in much denser crosslinks than when using a single agent. After immersion, numerous cracks were observed on coatings cured with a single agent, whereas the double-agent-cured coating remained integrated. The impedance of the double-agent-cured coating reached $8.5 \times 10^8 \Omega \text{ cm}^2$ and remained as high as $1.7 \times 10^8 \Omega \text{ cm}^2$, even after 40 days of immersion.

Keywords: epoxy coating, titanium ion curing agent, polysiloxane, anticorrosion

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