Anticorrosion Properties of Waterborne Polyurethane Coating Containing Caffeate Anions Intercalated LDH

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LDH with caffeate anions intercalation was successfully prepared by acidification of LDH and followed ionic exchange process. Waterborne polyurethane based coatings with and without 0.5 wt% LDH and 0.5 wt% caffeate anions intercalated LDH (LCA) were fabricated with the thickness of $70 \pm 4 \mu\text{m}$. EIS and LEIS were used to characterize the electrochemical and micro-area corrosive behavior of LDH-doped coatings. It displayed that the addition of LDH loaded with caffeate anions improved the impedance of PU from 1.47×10^7 to $3.93 \times 10^7 \Omega \text{ cm}^2$ after 30 days immersion in 3.5% NaCl solution. In addition, the micro-area corrosive condition of LCA containing PU is better than that in pure PU and LDH containing PU coating, which could ascribe to the emancipation of intercalated caffeate ions in LDH. The addition of LCA nanohybrids into PU could enhance the barrier performances of PU. Moreover, the excellent ions exchanges ability of LDH could be used to adsorb chloride ions, and the release of caffeate anions could delay the process of corrosion reactions. The synergistic effect of caffeate anions and LDH improves the anti-corrosion performance of waterborne PU.

Keywords: barrier effect, ionic exchange, waterborne polyurethane coating

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