Title Preparation and anti-corrosive performance study of waterborne epoxy coatings with LDH fillers functionalized by WO_4^{2-} and Ce^{3+}

Fengting Cao[1], Yaxiong Sun[1], Tiegang Wang[1], Qixiang Fan[1], Yanmei Liu[1]

[1] *School of Mechanical Engineering, Tianjin Key Laboratory of High Speed Cutting and Precision Machining, Tianjin University of Technology and Education, Tianjin 300222, China*

Abstract Water-based epoxy coating (WEP) has attracted much attention because of its non-toxicity and good adhesion, but its loose structure leads to the poor corrosion protection against metal matrix. In this paper, sodium tungstate and cerous nitrate were chosen as precursors to modify hydrotalcite(LDH) for preparing composite fillers.The composition analysis of LDH and its modified fillers LDH-W, LDH-Ce and LDH-W-Ce, were carried out by SEM, XRD, FTIR and XPS. Results showed that a new layer containing tungstate and cerium ions was formed on the surface of LDH particles. This film, combined with the shielding properties of LDH itself, gives the coating outstanding corrosion resistance in 3.5wt.% NaCl solution. The anti-corrosive properties of WEP with the prepared fillers were systematically evaluated by electrochemical methods (EIS, PDP). EIS shows that WEP/LDH-W-Ce coating has the best corrosion resistance, and the low-frequency impedance modulus of the coating $|Z|_{0.01Hz}$ is two orders of magnitude higher than that of the blank coating WEP. In addition, WEP/ LDH-W-CE composite coating has good self-repair performance, which is mainly attributed to the synergistic effect of WO_4^{2-} and Ce^{3+} in LDH. These two ions can play the role of corrosion inhibitors and generate repaired layer after coating being damaged, endow the coating active protection ability. This work is essential for the enhancement of anti-corrosive performance of water-based epoxy coating.

Keywords waterborne epoxy coating, corrosion, LDH

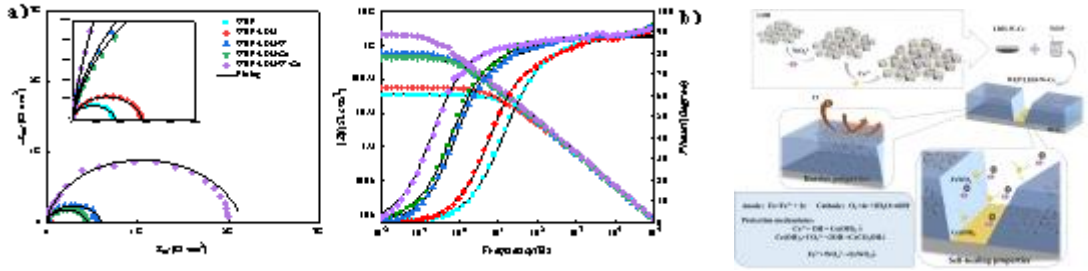

Fig.1 The anti-corrosive performance and mechanism schematic diagram of coatings with different fillers based on LDH

Reference

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