Study of formation and corrosion resistance of Ce-doped ZnAl hydrotalcite layers on different zinc alloys coated steel

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Due to their unique structure, hydrotalcite (HT) can trap and hold aggressive corrosive anions in their positively charged layers [1]. Moreover, hydrotalcite can be directly grown on the metal surface and form a physical protective layer avoiding the exposure of substrate to corrosive environments [2]. Recently, various methods have been investigated to prepare HT layers as smart anti-corrosion coatings on surfaces of zinc alloys and galvanized steel [3, 4]. However, the preparation and corrosion resistance assessment of "in-situ" La/Ce-doped HT layer on galvanized steel substrates have not been still well investigated. This study aims at investigating the influence of composition and roughness of the zinc coated steel substrates such as hot-dip galvanized steel, Zn-Al coated steel, and Zn-Al-Mg coated steel substrates on the formation and the anti-corrosion properties of Ce-doped ZnAl HT layers grown by the "in-situ" synthesis method at pH 12. The structural and morphological properties of Ce-doped ZnAl HT layers were detected by Fourier-transform infrared spectroscopy, X-ray diffraction, X-ray photoelectron spectroscopy, and electron microscopy/energy dispersive X-ray spectroscopy. The corrosion behaviour of layers was recorded by electrochemical methods such as potentiodynamic polarization and electrochemical impedance spectroscopy during 168 h immersion in sodium chloride (0.1 M). Besides, the inhibitive effect of Ce-doped ZnAl HT layers on all corrosion substrates was discussed in detail.

References

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