Influence of Electrochemical properties on Surface Micromorphology of Zn-Al-Mg-RE alloy coatings

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Zn-Al-Mg-RE series hot-dip alloy coatings developed which provide effective protection of mild steel surface against corrosion and oxidation were investigated by Scanning Electron Microscopy (SEM), 3D Optical Microscopes, X-ray diffraction (XRD). Significant variation in coating surface morphology, polarization parameters and impedance characteristics are observed with increasing content of Al and Mg element in this paper. It is found that the charge transfer resistance of electrode reaction (R_{ct}) has an inversely proportional relationship with the surface corrosion roughness (R_a) of corroded coatings. Furthermore, the better corrosion resistance derived from certain eutectic reaction in Zn-Al-Mg-RE alloy eutectic process has been indicated in terms of this dynamic relationship. The complex effects on independent processes from initial uncorroded surface microstructure changes in characteristics during and after electrochemical measurement have been represented for different compositions of alloy coatings.

Keywords: Zn-Al-Mg-RE alloy; alloy coatings; electrochemical; microstructure; corrosion rate; surface

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