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Enhancement of the Corrosion Resistance of Zinc-aluminum-chromium Coating with Cerium Nitrate

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Abstract

The present work aims at evaluating the effect of cerium nitrate on corrosion resistance of mild carbon steel coated by Dacromet in 3.5% NaCl solution. The scanning electron microscope (SEM) and energy dispersive X ray spectroscope (EDX) analysis were carried out to compare the surface structure and the composition of Dacromet coating and Dacromet +Re coating. The results of the electrochemical measurement showed that, compared with Dacromet coating, Dacromet+Re coating had a longer controlled sacrificial anodic protection function to steel substrate, a lower corrosion current density (i_{corr}) and a higher corrosion potential (E_{corr}). The modulus values of |Z| of Dacromet+Re coating is about 1 order of magnitude higher than that of Dacromet coating at low-frequency region.

Keywords: Dacromet; Cerium nitrate; Corrosion resistance; Electrochemical impedance spectroscopy

1. Introduction

Zinc-aluminum-chromium coating, also named as Dacromet, is a water-based and VOC (volatile organic compound) compliant coating [1-5]. The coating was obtained through dipping specimens in (or brushing specimens with) the slurry used for Dacromet, which consists principally of ultra-fine zinc and aluminum flakes together with chromate. The zinc and aluminum flakes align in multiple layers forming a metallic silver gray coating. Applied as a liquid material, the coating becomes totally inorganic after baking and sintering at a certain temperature. This technique is a new kind of metal surface treating technique, which differs from either electroplating or hot dip of zinc or zinc-rich coating [6]. Dacromet has excellent corrosion

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