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Effects of benzotriazole on the magnesium phosphate coating

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Abstract:

Magnesium phosphate coatings are extensively used on carbon steel to improve their corrosion resistance. The effect of benzotriazole on the magnesium phosphate coating was investigated. The phosphate coatings were deposited on carbon steel at different bath temperature, room temperature (RM), 60 °C and 80 °C. The change of crystalline phase, morphology, the sludge weight, bath efficiency factor, and corrosion behavior of the coatings after the addition of benzotriazole (BTAH) were investigated by means of Scanning Electron Microscopy (SEM), X-ray diffraction (XRD), and potentiodynamic polarization methods. The adsorption of BTAH during the formation of magnesium phosphate coating was also investigated by means of XPS. The effect of BTAH on the formation of magnesium phosphate coating was discussed. The adsorbed BTAH layer could favor the nucleation of phosphate coating by supplying more nuclei centers which leadsleading to the formation of more compact phosphate coating. Meanwhile, the adsorbed atoms can block the active sites and generate a barrier to reduce the transport of corrosive species to the metal surface and hence improve the corrosion behavior of carbon steels.

Keywords:

magnesium phosphate coating, carbon steel, benzotriazole, anti-corrosion property

Highlights:

The effect of benzotriazole on the magnesium phosphate coating was investigated.
The crystalline phase, morphology and corrosion behavior were investigated.
The adsorbed BTAH layer could favor the nucleation of phosphate coating.
It can hence improve the corrosion behavior of carbon steels.

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