

表面与界面工程

## 不同表面处理条件下复合涂层体系失效过程的EIS特征

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摘要

研究了不同表面处理条件下环氧富锌/环氧云母氧化铁/氯化橡胶涂层体系的电化学阻抗谱特征。利用Bode图、涂层吸水率、涂层电阻及特征频率的变化评价了表面处理对涂层防护性能的影响。结果表明, 基材表面状态不同的复合涂层体系吸水率相对稳定阶段所持续的时间长短顺序为: 手工打磨>表面锈蚀>表面未处理, 与涂层的防护寿命长短、涂层/基材间的黏附力大小顺序一致。此外, 不论基材表面处理程度如何, 当涂层体系的特征频率增加到1400 Hz左右时, 涂层电阻均发生较快降低, 吸水率发生较大增长, 涂层失去防护作用。

关键词

[电化学阻抗](#) [涂层](#) [表面处理](#) [腐蚀](#)

分类号

## EIS study of multilayer organic coatings on steel with different surface pretreatments

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### Abstract

The failure process of zinc-rich epoxy/epoxy micaceous iron oxide/chlorinated rubber coatings on Q235 steels with three different surface pretreatments was investigated by electrochemical impedance spectroscopy (EIS). The Bode plots, water uptake, coating capacitance and break point frequency were determined by EIS to evaluate the protection characteristics of three coating systems. The results showed that the coatings on manually polished steel provided superior protection as compared to others due to wider saturation range, longer protection life and greater adhesion, the coatings on rusted steel ranked secondly, and the coatings on steel without pretreatment ranked thirdly. When the break point frequency increased to 1400 Hz approximately, coating resistance decreased sharply, and water uptake increased quickly, which caused serious steel corrosion.

### Key words

[EIS](#) [coatings](#) [surface pretreatment](#) [corrosion](#)

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