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研究论文

纳米SiO2对低碳钢表面磷化膜的结构和耐蚀性的影响

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摘要: 使用加入纳米SiO_2的低温磷化液在低碳钢表面制备了磷化膜, 并对其形貌、成分、厚度、粗糙度以及耐蚀性进行表征, 研究了纳米SiO_2对磷化膜结构和性能的影响。结果表明, 纳米SiO_2不是磷化膜的主要成分, 但是在磷化液中添加纳米SiO_2使磷化膜增厚、细化磷化膜晶粒、提高磷化膜致密度, 并提高了磷化膜的耐腐蚀性能。当纳米SiO_2的加入量为2 g/L时, 磷化膜在5%NaCl溶液中的耐腐蚀性最好, 腐蚀电流密度为0.231 μA/cm^2。

关键词: 材料失效与保护 磷化 低碳钢 纳米SiO2 耐腐蚀性

Influence of Nano SiO2 on Structure and Corrosion Resistance of Phosphate Coating on Surface of Mild Steel

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Abstract: Under the low temperature conditions, phosphate coating on the surface of mild steel by the addition of nano-SiO2 in phosphating solution was prepared in this paper. The influence of nano-SiO2 on structure and performance of phosphate coating was investigated by SEM, XRD, EDS, thickness, surface roughness and corrosion electrochemical testing. The results show that although nano-SiO2 is not main component of phosphate coating, but the coating thickness decreases with increasing the concentration of nano-SiO2, nano-SiO2 can reduce the crystal size of coating and increase the density and corrosion resistance of coating. When the nano-SiO2 concentration is 2 g/L, the best corrosion resistance of phosphate coating is obtained in 3.5% NaCl solution. The corrosion current of phosphating sample was 0.231 μA/cm2 in 5% NaCl solution.

Keywords: materials failure and protection phosphorization mild steel nano-SiO2 corrosion resistance

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