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ZK60镁合金磷酸盐及锡酸盐化学转化膜

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摘要: 为了提高ZK60镁合金的耐腐蚀性能, 利用磷酸盐溶液或锡酸盐溶液, 考察了在ZK60镁合金上形成磷酸盐或锡酸盐化学转换膜的工艺条件及膜层的耐蚀性能。通过改变处理时间和温度, 可以得到性能不同的转换膜。通过电化学阻抗谱技术和极化曲线技术研究转化膜的耐腐蚀性能, 利用扫描电镜研究其微观结构。结果表明: 在磷酸盐溶液中, 当处理温度为50 °C时, 磷化30 min后试样的电荷转移电阻(R_{ct})为224.03 $\Omega \cdot \text{cm}^2$; 当温度为80 °C, 反应时间为45 min时, 所得转换膜的 R_{ct} 为377.67 $\Omega \cdot \text{cm}^2$, 阻值最大, 耐腐蚀性能最好; 对于锡酸盐化学转化膜, 90 °C下, 处理60 min的膜层耐蚀性能最好, 其 R_{ct} 为388.32 $\Omega \cdot \text{cm}^2$, 与磷酸盐化学转化膜相比, 两种膜的保护性能相差不大。

关键字: 化学转化膜; 磷酸盐; 锡酸盐; 腐蚀; 电化学阻抗谱

Phosphate and stannate chemical conversion coatings on ZK60 magnesium alloy

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Abstract: In order to enhance the anti-corrosive performance of ZK60 magnesium alloy, the chemical conversion coatings on ZK60 magnesium alloy obtained from phosphate or stannate solutions were studied. Different chemical conversion coatings were obtained by changing the processing time and temperature. The anti-corrosive performance of coatings was studied by electrochemical impedance spectroscopy and potentiodynamic polarization curves, the microscopic structures were studied by SEM. The results indicate that the charge transfer resistance(R_{ct}) of the sample treated at 50 °C for 30 min is 224.03

$\Omega\cdot\text{cm}^2$, while the Rct of chemical conversion coatings obtained in phosphate solution at 80 °C for 45min is 377.67 $\Omega\cdot\text{cm}^2$, showing the highest anti-corrosive performance. For the stannate chemical conversion coatings, the coating obtained at 90 °C for 60 min has the best anti-corrosive performance with Rct value of 388.32 $\Omega\cdot\text{cm}^2$, but compared with the phosphate chemical conversion coatings, the difference in anti-corrosive performance is not obvious.

Key words: chemical conversion coating; phosphate; stannate; corrosion; electrochemical impedance spectroscopy

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