

论文

电化学噪声和电化学阻抗谱监测 1Cr18Ni9Ti 不锈钢的初期点蚀行为

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摘要:

采用电化学噪声和电化学阻抗谱技术,研究1Cr18Ni9Ti不锈钢在3.5%NaCl溶液中的早期腐蚀行为。研究表明,浸泡初期(0h~48h),电化学噪声电位、电流在测量时间范围内漂移较小,电位谱功率(PSDV)曲线的斜率几乎不变;电化学阻抗谱在低频下出现感抗特征,表明研究电极表面发生钝化膜破裂与修复的交替过程,即出现了亚稳态蚀点。浸泡中期(48h~60h),电化学噪声出现尖峰波动,谱功率曲线的斜率产生突变,电化学阻抗谱的低频感抗特征消失,表明研究电极表面的亚稳态蚀点转化为稳定蚀点。扫描电镜表面形貌分析表明,浸泡60h后研究电极表面出现明显蚀点。

关键词: 1Cr18Ni9Ti不锈钢 点蚀 电化学噪声 电化学

MONITORING THE INITIAL PITTING BEHAVIORS OF 1Cr18Ni9Ti STAINLESS STEEL BY ELECTROCHEMICAL NOISE AND ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY

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Abstract:

The initial pitting of 1Cr18Ni9Ti stainless steel in 3.5% NaCl solution was studied by electrochemical noise(ECN) and electrochemical impedance spectroscopy(EIS). The results indicated that, the initial immersion stage (to 48 hours), the fluctuation amplitude of potential and current noise were small, the slope of the power spectral density of potential(PSDV)plots changed hardly,and an inductive component was observed on impedance plane, which means the formation of the metastable pitting and continuous repairation of the passive film on the surface of the 1Cr18Ni9Ti stainless steel.When immersed to the stage of 48 hours to 60 hours,noise pulse emerged in the plots of electrochemical noise,the slope of the power spectral density (PSD) plots changed suddenly, on the impedance plane inductive component disappeared, which means the transition from metastable to stable pitting. SEM image showed pitting emerged in the surface after immersion for 60 hours.

Keywords: 1Cr18Ni9Ti stainless steel pitting corrosion ECN EIS SEM

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