

论文

十二胺对氯化钠溶液中铜镍合金的缓蚀行为及吸附机理的研究

屈钧娥;郭兴蓬

华中科技大学化学系应用化学系

摘要:

用电化学方法和原子力显微镜(AFM)研究了NaCl溶液中十二胺在铜镍合金表面的缓蚀及吸附行为.结果表明,十二胺对阴极和阳极反应均有抑制作用,但主要抑制了阴极反应.吸附模型的拟合结果证明十二胺在铜镍合金表面的吸附符合Flory-Huggins等温线模型.十二胺吸附膜改变了电极表面双电层结构,使零电荷电位正移.AFM相位图显示,随着缓蚀剂浓度增加,缓蚀剂吸附层变得更加致密和有序,导致缓蚀效率增加.AFM力曲线测试结果指出,含有十二胺的溶液中力曲线显示粘附力特性,而且探针与样品表面之间的长程静电斥力与空白溶液相比有减小趋势.

关键词: 铜镍合金 十二胺 吸附 原子力显微镜

Corrosion Inhibition and Adsorption Mechanism of Dodecylamine for Copper-Nickel Alloy in NaCl Solutions

June Qv;Xingpeng Guo

华中科技大学化学系应用化学系

Abstract:

The corrosion inhibition behavior and adsorption mechanism of dodecylamine for a copper-nickel alloy in 0.2 mol/L NaCl solutions was studied by electrochemical methods and atomic force microscopy (AFM).The results showed that dodecylamine had both cathodic and anodic inhibition action,but the cathodic effect was dominant.The adsorption behaviour of dodecylamine obeyed Flory-Huggins isotherm model.The adsorbed dodecylamine film changed the structure of the double-electric layer and made the potential of zero charge (PZC) shift to the positive direction.It can be concluded from the AFM phase images that as the inhibitor concentration increased,the adsorbed film of inhibitor tended to become more density and orderly so that corrosion inhibition efficiency increased.AFM force curve measurements were also performed and showed that as a result of the adsorption of dodecylamine on copper-nickel alloy surface,adhesive forces between the tip and the sample surface were detected and the long-range electrostatic repulsive forces between the tip and the sample surface were decreased.

Keywords: Cu-Ni alloy dodecylamine adsorption atomic force microscopy (AFM)

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通讯作者: 屈钧娥

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