

研究论文

酸性介质中丙烯基硫脲对铜阳极溶出和阴极沉积过程影响的EQCM研究

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收稿日期 2005-11-28 修回日期 网络版发布日期 2006-9-19 接受日期

摘要 采用循环伏安(CV)和电化学石英晶体微天平(EQCM)方法研究了酸性介质中铜阳极溶出和阴极沉积过程以及丙烯基硫脲(AT)对该过程的影响. 结果表明, 铜阳极溶出和阴极沉积过程的 M/n 分别为32.0和34.2 g/mol, 都是两电子过程, 其间未检测到Cu(I)中间产物. AT改变了铜阳极溶出和阴极沉积的历程. 在含AT的溶液中, 铜阳极溶出和阴极沉积过程的 M/n 分别为61.9和65.4 g/mol, 可指认铜阳极溶出产物为CuAT⁺, 并提出了AT存在下Cu阳极溶出和阴极沉积过程的反应机理; 从电极表面质量定量变化的角度提供了Cu阳极溶出和阴极沉积过程的新数据.

关键词 [铜](#) [石英晶体微天平](#) [电沉积](#) [阳极溶出](#) [丙烯基硫脲](#)

分类号 [0646.54](#) [0433](#)

EQCM Study of Effect of Allyl Thiourea on Anodic Dissolution and Cathodic Deposition of Cu in Acidic Media

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Abstract

The anodic dissolution and cathodic deposition of Cu and effect of allyl thiourea on the processes in acidic media were investigated by using cyclic voltammetry and EQCM. The experimental results demonstrated that there is only one current peak in the anodic dissolution and cathodic deposition of Cu, the M/n value of which is 32.0 and 34.2 g/mol, respectively, showing that the anodic dissolution and cathodic deposition of Cu correspond to the two-electron processes. No Cu⁺ ions, adsorbed Cu(I) species or intermediate Cu⁺ was evidenced by *in situ* EQCM measurements, allyl thiourea may change the mechanism of the anodic dissolution and cathodic deposition of Cu. The M/n values of the anodic dissolution and cathodic deposition of Cu in the presence of allyl thiourea are 61.9 and 65.4 g/mol, respectively, indicating the one-electron processes and producing Cu(I) species. The mechanism of the anodic dissolution and cathodic deposition of Cu can be considered as: AT(solution)=AT(surface); Cu=Cu⁺(solution)+e; Cu⁺+AT=(CuAT)⁺(solution). The EQCM studies provided quantitative results of surface mass changes during cathodic deposition and anodic dissolution of Cu, and threw a new light in the elucidating electrodeposition and anodic dissolution of Cu.

Key words [Copper](#) [Electrochemical quartz crystal microbalance](#) [Electro deposition](#) [Anodic dissolution](#) [Allyl thiourea](#)

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