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苯并三氮唑和5-羧基苯并三氮唑对铜缓蚀作用的光电化学比较

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摘要: 采用光电化学方法和交流阻抗方法对不同浓度的BTA(苯并三氮唑)和5CBTA(5-羧基苯并三氮唑)在硼砂缓冲溶液(pH 9.2)中对铜电极的缓蚀性能作了比较研究。研究发现两者对铜的缓蚀作用机理不同。一定浓度的BTA能使电极表面Cu₂O膜的结构改变, 在电位正向扫描过程中铜电极光响应由p型转化为n型, 并可依此判断缓蚀剂的缓蚀性能, n型光响应越大, 缓蚀剂的缓蚀性能越好; 而5CBTA能使电极表面的Cu₂O膜增多, 在电位负向扫描过程中阴极光电流密度明显增大, 并可据此判断缓蚀剂的缓蚀性能, 阴极光电流密度愈大, 缓蚀效果越好。同时这两种缓蚀剂均可用 ϕV 和某一较负电位下的阴极光电流密度 J_{ph} 的大小来判断缓蚀剂的缓蚀性能, ϕV 和 J_{ph} 越负, 缓蚀性能越好。交流阻抗方法的结果和光电化学的结果相一致。

关键字: 苯并三氮唑; 5-羧基苯并三氮唑; 铜电极; 光电化学; 交流阻抗

Photoelectrochemical comparison of inhibiting action of BTA and 5CBTA on copper

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Abstract: The photoelectrochemistry behaviour of copper electrode in buffer borax solutions (pH 9.2) containing BTA and 5CBTA was comparatively studied by using photoelectrochemistry technique. The inhibition mechanisms of BTA and 5CBTA for copper corrosion are different. The photoresponse for copper electrode in solution containing a certain amount of BTA exhibits n type during anodic polarization, the bigger the n-type photoresponse, the better the inhibition of the

inhibitor; the photoresponse for copper electrode in solutions containing 5CBTA always exhibits p-type during anodic polarization, but the photoresponse changes evidently during cathodic polarization, the bigger the maximum cathodic photocurrent, the better the inhibition of the inhibitor. Inhibitors can be evaluated by ϕV and J_{ph} at a more negative potential, the more negative the ϕV and J_{ph} , the better the inhibition. The results from photoelectrochemical technique are in agreement with those from AC impedance technique.

Key words: BTA; 5CBTA; copper electrode; photoelectrochemistry; AC impedance

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