

铂电极在碱性含氧溶液中的预还原处理对鲁米诺电致化学发光的影响

孙玉刚,崔华,林祥钦

中国科学技术大学化学系,合肥(230026)

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摘要 研究了铂电极的不同预极化处理过程对碱性鲁米诺阳极电致化学发光(ECL)和阳极极化曲线的影响,发现在碱性含氧溶液中预还原处理的铂电极可增强0.22V(vs.SCE)处发光峰强度,且催化产生1.07V(vs.SCE)

附近氧气析出过程并伴随产生明显的ECL发光峰;在酸性溶液中预处理电极可抑制这些活性。给出了催化氧气析出的可能作用机理:在碱性溶液中溶解氧还原生成了吸附在铂电极表面的(OH[•])-a-d-s,从而回忆了氧气的析出过程。同时给出了在碱性含氧溶液中预还原的铂电极上两个可能的ECL反应通道:(1)在0.22V鲁米诺阴离子氧化为鲁米诺自由基,然后与溶解氧反应而发光;(2)1.07V处析出的新鲜氧与鲁米诺阴离子反应而发光。

关键词 [铂电极](#) [卢米诺](#) [电致发光](#) [还原](#)

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Study of electrochemiluminescence of luminol at Pt electrodes cathodically pre-polarized in alkaline solution

Sun Yugang,Cui Hua,Lin Xiangqin

Univ Sci & Technol China, Dept Chem.Hefei(230026)

Abstract The effect of pre-polarization for Pt electrode on the behavior of anodic electrochemiluminescence (ECL) of luminol in alkaline solution was studied. It was found that the Pt electrode cathodically prepolarized in alkaline solution with dissolved oxygen could enhance the ECL peak at about 0.22V(vs. SCE). Moreover, it could catalyze the evolution process of oxygen at about 1.07V (vs. SCE) accompanied with a new ECL peak. However, the pre-treatment for Pt electrode in sulfuric acid solution inhibited these activities. The possible catalytic mechanism of the oxygen evolution process is proposed. In alkaline solution, the dissolved oxygen was reduced to the hydroxide ion and adsorbed on the surface of electrode, which increased the rate of oxygen evolution. The possible mechanism for the two ECL channels at the Pt electrode cathodically pre-polarized in alkaline solution is also proposed: (1) luminol anion was electrooxidized to radical at 0.22V, which then reacted with the oxygen dissolved in solution and emitted light; (2) the fresh oxygen species electro-generated at 1.07V oxidized luminol anion with light emission.

Key words [PLATINUM ELECTRODE](#) [ELECTROLUMINESCENCE](#) [REDUCTION](#)

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