

Full Paper

铁氧化铜修饰陶瓷碳复合电极的制备、电化学性质及其电催化性能

于浩, 郑建斌*

西北大学分析科学研究所/陕西省电分析化学重点实验室, 陕西西安, 710069

收稿日期 2006-6-29 修回日期 2006-12-27 网络版发布日期 2007-4-25 接受日期

摘要 采用两步溶胶-

凝胶技术制备了铁氧化铜修饰陶瓷碳复合电极。研究了该修饰电极的电化学性质和电催化活性。结果表明: 该修饰电极在

0.4~1.0V电位范围内产生一对准可逆的表面控制的氧化还原峰, 电极反应电子传递速率常数(k_s)为 10.37s^{-1} , 式量电位 E^0 为

0.682V(vs. SCE), 且对 K^+ 离子活度具有能斯特响应。该修饰电极对肼的氧化具有很好的电催化作用,

异相催化反应速率常数为 $3.29 \times 10^3 \text{M}^{-1} \cdot \text{s}^{-1}$ 。安培法检测肼的线性范围为 $3.0 \times 10^{-6} \sim 7.5 \times 10^{-4} \text{mol} \cdot \text{dm}^{-3}$, 检出限为 $8.0 \times 10^{-7} \text{mol} \cdot \text{dm}^{-3}$ 。

该修饰电极具有修饰程序简单、表面更新容易、稳定性好、对肼的响应快和线性范围宽等特点, 有望用于化学试剂、工业产品和生物样品中肼含量的测定。

关键词 [铁氧化铜, 复合陶瓷碳电极, 电催化氧化, 肼, 安培检测](#)

分类号

Preparation, Electrochemical Behavior and Electrocatalytic Activity of a Copper Hexacyanoferrate Modified Ceramic Carbon Electrode

YU Hao, ZHENG Jian-Bin*

Institute of Analytical Science, Shaanxi Province Key Laboratory of Electroanalytical Chemistry, Northwest University, Xi'an, Shaanxi 710069, China

Abstract A copper hexacyanoferrate modified ceramic carbon electrode (CuHCF/CCE) had been prepared by two-step sol-gel technique and characterized using electrochemical methods. The resulting modified electrode showed a pair of well-defined surface waves in the potential range of 0.40 to 1.0 V with the formal potential of 0.682 V (vs. SCE) in $0.050 \text{mol} \cdot \text{dm}^{-3}$ HOAc-NaOAc buffer containing $0.30 \text{mol} \cdot \text{dm}^{-3}$ KCl. The charge transfer coefficient (α) and charge transfer rate constant (k_s) for the modified electrode were calculated. The electrocatalytic activity of this modified electrode to hydrazine was also investigated, and chronoamperometry was exploited to conveniently determine the diffusion coefficient (D) of hydrazine in solution and the catalytic rate constant (k_{cat}). Finally, hydrazine was determined with amperometry using the resulting modified electrode. The calibration plot for hydrazine determination was linear in $3.0 \times 10^{-6} \sim 7.5 \times 10^{-4} \text{mol} \cdot \text{dm}^{-3}$ with the detection limit of $8.0 \times 10^{-7} \text{mol} \cdot \text{dm}^{-3}$. This modified electrode had some advantages over the modified film electrodes constructed by the conventional methods, such as renewable surface, good long-term stability, excellent catalytic activity and short response time to hydrazine.

Key words [copper hexacyanoferrate](#) [ceramic carbon electrode](#) [chronoamperometry](#) [electrocatalytic oxidation](#) [hydrazine amperometry](#)

DOI:

通讯作者 ZHENG Jian-Bin zhengjb@nwu.edu.cn

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(0KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ 本刊中 包含“[铁氧化铜, 复合陶瓷碳电极, 电催化氧化, 肼, 安培检测](#)”的 相关文章

▶ 本文作者相关文章

· [于浩](#)

· [郑建斌](#)