

研究论文

磁性普鲁士蓝纳米颗粒的合成及其化学修饰电极的制作

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摘要 利用 FeSO_4 与 FeCl_3 合成了超细磁性 Fe_3O_4 纳米颗粒,并进一步利用该纳米颗粒与铁氰酸钾在酸性溶液($\text{pH}\sim 2$)中的化学反应成功制备了一种新型的磁性普鲁士蓝纳米颗粒;研究了该磁性颗粒的磁学性能,通过磁力将其修饰于固体石蜡碳糊电极表面制成了化学修饰电极,考察了该电极对过氧化氢的电催化还原及对水合肼的电催化氧化特性.

该化学修饰电极可对过氧化氢和水合肼进行测定,线性范围分别为过氧化氢 $2\times 10^{-6}\sim 5\times 10^{-3}$ mol/L,水合肼 $7.2\times 10^{-7}\sim 3.6\times 10^{-4}$ mol/L.利用磁性普鲁士蓝纳米颗粒制得的修饰电极具有催化性能高、稳定性好、表面易更新等优点.

关键词 [磁性纳米颗粒](#) [化学修饰电极](#) [普鲁士蓝](#) [过氧化氢](#) [水合肼](#)

分类号

Synthesis of Magnetic Prussian Blue Nanoparticles and the Fabrication of Chemically Modified Electrode

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Abstract A novel method for chemically synthesizing Prussian blue (PB) magnetic nanoparticles was developed. Firstly magnetic Fe_3O_4 granule was obtained by the reaction between FeSO_4 and FeCl_3 under $80\text{ }^\circ\text{C}$, then such Fe_3O_4 granule was reacted with $\text{K}_3\text{Fe}(\text{CN})_6$ in acidic solution ($\text{pH}\sim 2$) to form magnetic PB nanoparticles. The magnetic properties of magnetic PB nanoparticles were studied. Chemically modified electrode based on magnetic PB nanoparticles attached on the surface of solid paraffin carbon paste electrode was prepared. Hydrogen peroxide and hydrazine hydrate were detected by this electrode. There was a linear relationship between the reductive peak height and the concentration of hydrogen peroxide in the concentration range of $2\times 10^{-6}\sim 5\times 10^{-3}$ mol/L, while the linear relation between the oxidation currents and the concentration of hydrazine hydrate was in the range of $7.2\times 10^{-7}\sim 3.6\times 10^{-4}$ mol/L. The modified electrode based on magnetic powder was renewable with the virtue of good electrocatalytic property.

Key words [magnetic nanoparticle](#) [chemically modified electrode](#) [Prussian blue](#) [hydrogen peroxide](#) [hydrazine hydrate](#)

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