

研究论文

表面等离子体共振技术与循环伏安法联用检测甲苯胺蓝

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摘要 将表面等离子体共振技术(SPR)与循环伏安法(CV)联用,并用小波变换提取实验数据,实现了甲苯胺蓝的定量检测.以传感片上的金膜为SPR测量基底,并作为电化学的工作电极,以Ag/AgCl电极(饱和KCl)为参比电极,以铂丝为对电极,同时进行SPR扫描和循环伏安法扫描,发现电化学聚合导致甲苯胺蓝氧化峰峰电位正移,还原峰峰电位不变,而SPR响应也整体下降;将SPR响应对电位求导后进而对电位作图,经小波变换处理后,发现波谱峰电位接近循环伏安法氧化还原法电位.利用该方法检测甲苯胺蓝的检出限与采用循环伏安法检测甲苯胺蓝的检出限在一个数量级上.

关键词 [表面等离子体共振](#) [循环伏安法](#) [甲苯胺蓝](#) [小波变换](#) [动力学分析](#)

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Determination of Toluidine Blue by Combination of Surface Plasmon Resonance with Cyclic Voltammetry

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Abstract A method based on the combination of surface plasmon resonance(SPR) with cyclic voltammetry(CV) with the aid of wavelet transform technique was established for the detection of toluidine blue. The gold film of the sensor chip was used as both the generator of SPR measurement and the work electrode of electrochemistry analysis, Ag/AgCl electrode as the reference electrode, and the Pt electrode as the counter electrode. The scans of SPR and CV were performed simultaneously. The results show that due to electro-chemical polymerization of toluidine blue, the potential of oxidation peak shifted positively, the potential of reduction peak remained constant, and the response of SPR fell totally. The results obtained by taking derivative on the SPR response were processed by wavelet transform, and it was found that the response increased linearly with the concentration in range of 8.18—16.35 mmol/L for toluidine blue, with the limit of detection(LOD) of 4.01 mmol/L. Both the linear range and the LOD obtained by the proposed method compare well with the figures of merit given by the CV.

Key words [Surface plasmon resonance\(SPR\)](#); [Cyclic voltammetry\(CV\)](#); [Toluidine blue](#); [Wavelet transform](#); [Kinetic analysis](#)

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