

研究论文

基于表面增强拉曼光谱的重金属离子检测

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摘要 以对巯基苯甲酸为拉曼标记和自组装修饰分子, 在光亮金基底上修饰后作为检测基底, 在金纳米粒子表面修饰后获得具有表面增强拉曼光谱信号的标记金溶胶. 修饰的基底及纳米离子通过重金属离子与羧基端的配位而发生相互作用, 最终形成“金属基底-对巯基苯甲酸/重金属离子/对巯基苯甲酸-金属纳米颗粒”的三明治结构. 采用扫描电镜表征纳米粒子的组装及以表面增强拉曼光谱检测表面标记分子的信号, 以此实现重金属离子的检测. 以强螯合剂EDTA溶液淋洗三明治结构, 使重金属离子与金属基底以及纳米颗粒上的羧基的配位作用断裂, 获得可再次利用的修饰金基底.

关键词 [重金属离子](#) [对巯基苯甲酸](#) [表面增强拉曼光谱](#) [金纳米粒子](#)

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Surface Enhanced Raman Spectroscopic Detection of Heavy Metal Ions

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Abstract The mercaptobenzoic acid (MBA) was served as the self-assemble modified and Raman-labeled molecules for the modification on a smooth gold surface and gold nanoparticles by self assemble monolayer method. By the interaction between heavy metal ions and the carboxyl groups from MBA attached to the gold surface and gold nanoparticles, the sandwich structure of "modified gold substrate/heavy metal ion/modified gold nanoparticles" was built for detection. The observation of nanoparticles in SEM images and the detection of surface enhanced Raman spectroscopy (SERS) of MBA in the sandwich structure indicated the existence of heavy metal ions in the solution. By using the strong chelation of EDTA with metal ions, the sandwich structure was immersed into EDTA solution to remove the heavy metal ions and the nanoparticles to obtain a fresh MBA modified gold substrate for the cyclic detection.

Key words [Heavy metal ion](#) [Mercaptobenzoic acid](#) [Surface enhanced Raman spectroscopy](#) [Gold nanoparticles](#)

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