

论文

机械抛光铜金属表面对罗丹明的荧光增强效应

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摘要:

应用激光光谱学方法,研究了铜表面Rh6G分子的荧光增强效应对金属衬底表面所形成的氧化层的依赖关系,探索了由于空气氧化而形成的氧化层在表面荧光增强效应中的重要意义和作用机理.实验采用罗丹明6G荧光探针分子,在532 nm连续光激发下,研究机械抛光铜金属衬底在经历不同氧化时间,对吸附其表面的Rh6G分子的荧光增强效果.研究表明,适当控制金属样品表面的氧化时间,金属铜表面对罗丹明分子的荧光发射表现出猝灭和增强效应.金属氧化层起到了隔离荧光分子与金属表面的作用,减弱了由于激发态荧光分子向金属转移非辐射能量和在金属表面诱导反向偶极子而产生的荧光猝灭效应,从而提高了纯金属铜表面荧光增强辐射行为.因此在微纳金属衬底的荧光增强效应研究中,采用适当的实验手段,精确控制隔离层间距,是表面增强光谱获取的重要途径之一.

关键词: 表面增强荧光 机械抛光铜衬底 金属氧化层 隔离层

Influence of Formative Native Oxide Layer on Mechanical Polished Cu Surface on Fluorescence Spectrum

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Abstract:

The enhanced fluorescence effect of Rh6G molecules deposited on physically polished copper surface was studied. The result shows that the formation of oxidation film on the metal surface plays an important role in the fluorescence emission. The quench and enhanced surface fluorescence effect from the physically polished rough copper surface with/without oxide layer were experimentally observed. The formative oxidation film was helpful to decrease the efficiency of the no-radiative energy transfer from the fluorophore to the metal surface, and enhanced fluorescence intensity will be obtained with the properly controlling of the spacer layer between the molecules and metal surface. The experimental observation was analyzed with the local field of surface enhanced fluorescence.

Keywords: Surface enhanced fluorescence Physically polished Copper surface Metal oxide layer Spacer

收稿日期 2011-12-19 修回日期 2012-03-23 网络版发布日期

DOI: 10.3788/gzxb20124107.0874

基金项目:

陕西师范大学大学生开放性实验基金(No.2010062)资助

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