

AOT反相胶束介质中敏化稀土离子荧光: 嘌呤类化合物为能量给体

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摘要 研究了反相胶束体系中敏化 Tb^{3+} 的离子荧光。在AOT/C6H12H2O反相胶束溶液中[AOT: 琥珀酸二(2-乙基己基)酯磺酸钠]发生了非常有效的从茶碱的三重态到 Tb^{3+} 的4f能层的能量转移, 并敏化稀土离子 Tb^{3+} 产生离子荧光。而在阳离子表面活性剂CTAB形成的反相胶束体系中, 只能观察到较弱的 Tb^{3+} 的离子荧光。表明在AOT反相胶束中 Tb^{3+} 是键合在磺酸头基上, 有利于能量转移过程, 显著增强 Tb^{3+} 的离子荧光。通过发光光谱和寿命测量, 详细讨论了AOT浓度和水泡大小(W值)等对敏化离子荧光的影响, 表明与 Tb^{3+} 离子水合的水分子的高频OH振动猝灭 Tb^{3+} 的离子发光, 该猝灭过程属静态猝灭。在较低的AOT浓度和较小的W值下, 可观察到较强的 Tb^{3+} 离子荧光, 并建立了AOT反相胶束中五种嘌呤类化合物的分析方法, 检出限在 $8.0 \times 10^{-9} \sim 8.0 \times 10^{-7} \text{ mol} \cdot \text{dm}^{-3}$ 之间。

关键词 [胶束](#) [嘌呤](#) [铽](#) [茶碱](#) [琥珀酸酯磺酸钠](#) [能量转移](#)

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Sensitized lanthanide luminescence in AOT reversed micelles---purine compounds as energy donor

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Abstract Sensitized lanthanide luminescence by purine compounds in AOT reversed micelles has been studied. A significant enhancement of sensitized room temperature luminescence has been observed using lanthanide Tb^{3+} as energy acceptor in AOT reversed micelles at low AOT concentration and W value, and weak Tb^{3+} emission has been observed in CTAB reversed micelles. The results indicate that Tb^{3+} ions are strongly bound to the sulfonate group of the AOT surfactant. Parameters including the concentration of AOT, solubilized water as well as acceptor concentration that may influence the sensitized lanthanide luminescence have been examined. The characteristics of luminescence and lifetimes of Tb^{3+} were used to elucidate the factors that affected sensitized luminescence. The results show that Tb^{3+} emission is quenched by the high frequency OH vibrations of the surrounding water molecules, the loss of Tb^{3+} emission high AOT concentration and W value suggests that the Tb^{3+} cation retains water in its coordination sites. The quenching process is static quenching. The low AOT concentration and W value should be recommended for obtaining high sensitivity in analytical application. The detection limits for purine and its derivations are between $8.0 \times 10^{-9} \sim 8.0 \times 10^{-7} \text{ mol} \cdot \text{dm}^{-3}$.

Key words [MICELLE](#) [PURINE](#) [TERBIUM](#) [THEOPHYLLINE](#) [SODIUM SULFOSUCCINATE ESTER](#)

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