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发光学应用及交叉前沿

近红外发射CdSeTe量子点测定铜离子

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摘要： 以$CdCl_2 \cdot 2.5H_2O$、Na_2SeO_3、Na_2TeO_3和$N_2H_4 \cdot H_2O$为反应物，以3-巯基丙酸（MPA）为稳定剂制备CdSeTe量子点。与CdTe量子点相比，CdSeTe合金量子点的发射光谱明显红移，发光颜色可扩展至近红外波段范围。基于铜离子能有效猝灭CdSeTe合金量子点荧光的特性，开发了一种用近红外CdSeTe量子点为荧光探针测定铜离子浓度的分析方法。在最佳实验条件下，该方法的线性检测范围为10～200 μg/L，检测上限为1.13 μg/L。应用于实际样品中铜的测定，结果与ICP测定值非常吻合。

关键词： 近红外量子点 铜离子 荧光猝灭

Determination of Copper Ion by Near-infrared-emitting CdSeTe Quantum Dots

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Abstract: CdSeTe quantum dots (QDs) were synthesized by the reaction of $CdCl_2 \cdot 2.5H_2O$, Na_2SeO_3, Na_2TeO_3 and $N_2H_4 \cdot H_2O$ in water and in the presence of 3-mercaptopropionic acid (MPA) as stabilizer. Comparing with the CdTe QDs, the CdSeTe alloy QDs showed an obvious red-shifted emission with the color-tune capability to the near-infrared (NIR) wavelength. The fluorescence of the CdSeTe QDs could be quenched by Cu^{2+} ions. A simple and rapid method for Cu^{2+} ions determination was proposed using the NIR CdSeTe QDs as fluorescent probes. Under optimal conditions, the response was linearly proportional to the concentration of Cu^{2+} ions from 10 to 200 μg/L, the limit of detection was 1.13 μg/L. The developed method was successfully applied to the detection of trace Cu in real samples, and the results coincided with the ICP method.

Keywords: near-infrared-emitting quantum dots copper ions fluorescence quenching
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