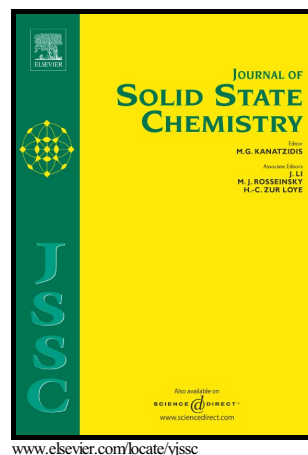


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Rapid and high-selectivity detection of rifampicin based on upconversion luminescence core-shell structure composites

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Abstract

In this work, a simple, rapid and high-selectivity method for detection of rifampicin based on upconversion luminescence core-shell structure $\text{NaYF}_4:\text{Yb}$, $\text{Tm}@\text{SiO}_2$ composites (UCCS) is developed via hydrothermal method, encapsulated with silica shells and characterized by X-ray diffraction (XRD), scanning electron microscope (SEM), Transmission electron microscopy (TEM), photoluminescence (PL) and lifetime measurement. Systematical luminescence studies showed that $\text{NaYF}_4:\text{Yb}$, $\text{Tm}@\text{SiO}_2$ represents a high quenching efficiency on detecting rifampicin through inner filter effects (IFE). Meanwhile, the fluorescence intensity of $\text{NaYF}_4:\text{Yb}$, $\text{Tm}@\text{SiO}_2$ decreased with the gradually increasing concentration of rifampicin and the low detection limit is $8.5 \mu\text{M}$. The sensing system was successfully applied in detection of rifampicin in human urine samples for the first time with high recyclability and the fluorescence quenching mechanism of UCCS/rifampicin mixture were also investigated deeply.

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