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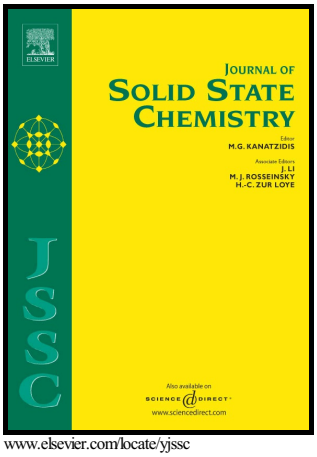

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Rapid and high-selectivity detection of rifampicin based on upconversion luminescence core-shell structure composites

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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 $NaYF_4$:Yb, Tm@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 $NaYF_4$:Yb, Tm@SiO_2 represents a high quenching efficiency on detecting rifampicin through inner filter effects (IFE). Meanwhile, the fluorescence intensity of $NaYF_4$:Yb, Tm@SiO_2 decreased with the gradually increasing concentration of rifampicin and the low detection limit is 8.5 μM. 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.