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$LaPO_4$:Eu fluorescent nanorods, synthesis, characterization and spectroscopic studies on interaction with human serum albumin

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Abstract

Eu^{3+} doped $LaPO_4$ fluorescent nanorods ($LaPO_4$:Eu) was successfully fabricated by a hydrothermal process. The obtained $LaPO_4$:Eu nanorods under the optimal conditions were characterized by means of transmission electron microscopy (TEM), X-ray diffraction (XRD) technique, Fourier transform infrared (FTIR), UV-vis absorption and fluorescence spectroscopy. The nanorods with a length of 50 – 100 nm and a diameter of about 10 nm, can emit strong red fluorescence upon excitation at 241nm. The FTIR result confirmed that there are lots of phosphate groups on the surfaces of nanorods. In order to better understand the physiological behavior of nanorods in human body, multiple spectroscopic methods were used to study the interaction between the $LaPO_4$:Eu nanorods and human serum albumin (HSA) in the simulated physiological conditions. The results indicated that the nanorods can effectively quench the intrinsic fluorescence of HSA through a dynamic quenching mode with the association constants of the order of 10^3 L/mol. The values of the thermodynamic parameters suggested that the binding of the nanorods to HSA was a spontaneous process and van der Waals forces and hydrogen bonds played a