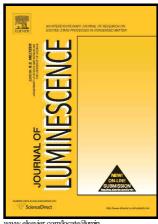
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ACCEPTED MANUSCRIPT

Photoluminescence properties of Eu^{3+} doped BaF_2 nanomaterials and BaF_2 : $3Eu/Fe_3O_4$ nanocomposite for hyperthermia application

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ABSTRACT

Cubical crystalline 3 at.% Eu^{3+} ion doped BaF_2 nanomaterials have been successfully synthesised by ethylene glycol route. The cubical crystalline structure of BaF_2 was confirmed by XRD analysis. FTIR study shows the significant capping of nanomaterials by ethylene glycol. Microscopy study indicates the change of shape of nanoparticles from spherical to rod at higher annealing temperature (900 °C). Photoluminescence studies give the characteristic emission of Eu^{3+} at 587 ($^5D_0 \rightarrow ^7F_1$, magnetic dipole transition) and 613 nm ($^5D_0 \rightarrow ^7F_2$, electric dipole transition). The decay time of as-prepared sample is longer than 900 °C annealed samples. The CIE chromaticity coordinates diagram shows the prepared nanomaterials can be used as orange-reddish emitter. The samples were dispersed in different organic solvents and observed that emission intensity increases with increase in chain length of the solvents. The prepared $Eu_{0.03}Ba_{0.97}F_2/Fe_3O_4$ nanocomposites can achieve hyperthermia temperature (HT) at sort period. Nanocomposite generates more heat than pure Fe_3O_4 nanoparticles.

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