

Nanocomposites and nanomaterials

Porous magnetic-luminescent nanocomposite based on lanthanide coordination polymer and ferrite nanoparticles

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Porous magnetic-luminescent nanocomposites are very perspective for biomedical applications. The complication in creating of materials with both magnetic and luminescent properties lies in luminescence quenching usually caused by electron exchange between paramagnetic particle and excited states of lanthanide ions. Magnetic-luminescent composites were synthesized covering magnetic particles with SiO₂ or polymer layer and coupling with luminescent organic dyes or quantum dots [1]. We succeed in production of composite with saving of luminescent properties in presence of magnetic component without isolation.

We used porous metal-organic framework Eu(BTB)(H₂O) (BTB³⁻ - 1,3,5-benzenetrisbenzoate) with large pores (free diameter >10 Å) and a high surface area (>1000 m²·g⁻¹) [2]. Composite was synthesized through polymer formation in the presence of superparamagnetic 8 nm CoFe₂O₄ nanoparticles.

According to XRD data complex structure was saved in composite. Excitation, fluorescence and phosphorescence spectra were measured for solid sample of composite at room temperature. Eu³⁺ emission intensity in luminescence spectrum of composite was found half as much compared with complex. Probably CoFe₂O₄ nanoparticles promote appearance of additional ways of non-radiative deactivation of Eu³⁺ excited states (specifically, electron exchange) and lightening of existing ways.

1. Kaewsaneha C., Tangboriboonrat P., Polpanich D., Elaissari A. Multifunctional Fluorescent-Magnetic Polymeric Colloidal Particles: Preparations and Bioanalytical Applications // *Appl Mater Interfaces*-2015.-7, N 42.-P. 23373-23386.
2. Devic T., Serre C., Audebrand N., Marrot J., Férey G. MIL-103, A 3-D Lanthanide-Based Metal Organic Framework with Large One-Dimensional Tunnels and A High Surface Area // *J Am Chem Soc.*-2005.-127, N 37.-P. 12788-12789.