

The effect of the core morphology of Eu(III)-doped nanoparticles on the ion exchange versus energy transfer between Eu(III) in the core and Cu(II) ions at the interface

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Abstract

The report represents the comparative analysis of luminescent properties of Eu(III) complex in colloids of silica-coated and layer-by-layer-fabricated nanoparticles. The diverse morphologies of these nanoparticles greatly affect their photophysical properties. The interfacial binding with d-ions exemplified by Cu(II) and the contributions of the ion exchange and energy transfer processes between Eu(III) ions confined within polymeric coating and Cu(II) ions at the interface of nanoparticles also depend on their morphology. The silica coating of Eu(III) complex does not prevent it from the efficient ion displacement by the interfacial Cu(II) ions, which results in the irreversible quenching of Eu(III)-centered luminescence. The lack of the ion exchange and the predominant energy transfer between Eu(III) ions in the core and interfacial Cu(II) ions are revealed in the colloids of Eu(III) complex reprecipitated from organic to aqueous solution and coated by the layer-by-layer-fabricated polyelectrolyte multilayer. The obtained results represent the synthetic route of the insertion of Cu(II) ions into the polyelectrolyte multilayer fabricated onto Eu(III) complex. © 2012 Springer Science+Business Media B.V.

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Keywords

Cu(II) ion, Energy transfer, Eu(III) complex, Heterometallic nanoparticles, Ion exchange, Luminescence