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Novel highly charged silica-coated Tb(III) nanoparticles with fluorescent properties sensitive to ion exchange and energy transfer processes in aqueous dispersions

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Abstract

Novel silica-coated Tb(III) nanoparticles with high luminescence were synthesized using the reverse microemulsion procedure. The quenching of luminescent properties of these nanoparticles can be achieved by ion exchange and energy transfer mechanisms. The quenching through the ion exchange of Tb(III) by H⁺ or La(III) is time dependent, indicating that the ion exchange is probably diffusion controlled. The quenching by Co(III) complex cations is achieved by the energy transfer mechanism and thus is not time dependent. The analysis of quenching data in Stern-Volmer coordinates reveal the negative charge of the silica-coated Tb(III)-TCAS nanoparticles and several types of luminophoric species, located within the core and close to the surface of silica nanoparticles. © Copyright 2009 American Chemical Society.

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