Highly Improved Quantum Yields of Dehydrated Lanthana-nide-based Coordination Polymers as Luminescent Thermometer in Low Temperature Range

Jinzeng Wang¹, Jinning Dong¹, Mengjuan Cui¹, Xiaolong Li¹, and Fang Wang¹

¹Shanxi Normal University

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Abstract

High quantum yields and energy transfer efficiency are favored by luminescent thermometers. In this work, dehydration process has been applied to remove 12 coordinated and isolated water molecules of 1 dimensional chains [Ln2(mip)3(H2O)8?4H2O][?] (abbreviated as Ln2MIP). The overall quantum yields of Tb3+ has been improved to 80% from 47.5% after dehydration. In dehydrated Gd0.2Tb1.08Eu0.72MIP, the energy transfer efficiency between Tb3+ and Eu3+ reaches 96% from 27% that result in improving the overall quantum yields of Eu3+ from 8.4% to 13.1%. Compared with hydrated Gd0.2Tb1.08Eu0.72MIP, the dehydrated phase presents 1.5 times temperature sensing range between IEu/ITb and temperature with improved Sre (0.564 % K-1). At the same time, the intensity of Eu3+ at 618 nm displays excellent temperature sensing ability from 77 K to 300 K after dehydration with improved quantum yields

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