

Photoluminescent silica aerogel containing a new prepared N-Hydroxysuccinimide –Tb(III) complex

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Abstract

The paper reports the preparation of a photo luminescent silica aerogel through embedding in a silica matrix of a new prepared Tb(III) complex using N-hydroxysuccinimide (NHSI) as ligand. In the first stage, the Tb(III) complex was prepared at 1:3 metal to ligand ratio. The obtained complex exhibit strong photo luminescence as a result of specific radiative transitions within the Tb(III) cation with the most intense peak located at 543 nm due to $^5D_4 \rightarrow ^7F_5$ transition. In the second stage, the complex was loaded in the silica matrix during a basic catalyzed sol-gel process. After ageing in ethanol, the alchogel was dried under supercritical regime by exchanging the ethanol with liquid CO₂ followed by supercritical evaporation. The obtained aerogel retain the remarkable photo luminescent properties of the free complex. Both, free complex and aerogel were investigated through thermal analysis, FT-IR, powder X-ray diffraction, SEM and fluorescence spectroscopy. For comparision purposes, an unloaded silica aerogel was also prepared and investigated through FT-IR, BET analysis and Powder X-ray diffraction. The excellent photoluminescent properties might recommend the prepared aerogel for applications in optoelectronic devices where photonic conversion materials are required.