

NO₂-BDC as sensitizer and photoluminescence properties of [(La)(NO₂-BDC)₃(H₂O)₄] and [(La_xLn_y)(NO₂-BDC)₃(H₂O)₄] (Ln = Eu, Tb)

Tuesday 22 May 2018 15:00 (1 hour)

Following our interest in photoluminescence properties of lanthanide coordination polymers constructed using 2-nitro-1,4-benzenedicarboxylate (NO₂-BDC²⁻ [1,2], the lanthanum and its europium and terbium doped samples have been prepared; [(La)(NO₂-BDC)₃(H₂O)₄] (1), [(La_{0.92}Eu_{0.08})(NO₂-BDC)₃(H₂O)₄] (2), [(La_{0.92}Tb_{0.08})(NO₂-BDC)₃(H₂O)₄] (3). According to the powder x-ray diffraction, 1-3 are isostructural exhibiting a dense 3D framework structures. Photoluminescence of the three samples were investigated among which only blue emission due to the intra-ligand fluorescence was found for 1 with the excitation at 337 nm. The doped samples 2 and 3 emitted the characteristic $f-f$ transitions at the same excitation wavelength; ⁵D₀-⁷F_J (J = 1, 2, 3, 4) at 588, 617, 672 and 693 nm for 2, and ⁵D₄-⁷F_J (J = 6, 5, 4, 3) at 488, 545, 586 and 620 nm for 3. Temperature dependent photoluminescence properties of 2 (Eu^{III}; ⁵D₀-⁷F₂) and 3 (Tb^{III}; ⁵D₄-⁷F₅) have been investigated in term of intensity, revealing significant difference in the Eu^{III} and Tb^{III} centered emissions in 333(2)-393(2)K range. The observed thermal responsive $f-f$ transitions of the doped samples is discussed.

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Session Classification: A013: Materials Physics (Poster)

Track Classification: Material Physics and Functional Materials