

Photoluminescence Spectroscopy to Probe Mixed Valence State in Eu-Doped Nanocrystalline Glass-Ceramics

Authors : Ruchika Bagga, Mauro Falconieri, Venu Gopal Achanta, José M. F. Ferreira, Ashutosh Goel, Gopi Sharma

Abstract : Mixed valence Eu-doped nanocrystalline NaAlSiO₄/NaY₉Si₆O₂₆ glass-ceramics have been prepared by controlled crystallization of melt quenched bulk glasses. XRD and SEM techniques were employed to characterize the crystallization process of the precursor glass and their resultant glass-ceramics. Photoluminescence spectroscopy was used to analyze the formation of divalent europium (Eu²⁺) from Eu³⁺ ions during high temperature synthesis under ambient atmosphere and is explained on the basis of optical basicity model. The observed luminescence properties of Eu: NaY₉Si₆O₂₆ are compared with that of well explored Eu: β -PbF₂ nanocrystals and their marked differences are discussed.

Keywords : rare earth, oxyfluoride glasses, nano-crystalline glass-ceramics, photoluminescence spectroscopy

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