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Optical and Luminescence from Ln³⁺ doped glasses and their applications

The enhancement of luminescence properties of Sm³⁺ in tellurite glasses containing silver nanoparticles (Ag-NPs) have been investigated. The glass samples with chemical composition of (53.5-x)(TeO₂ : 10ZnO : 35BaO : 1.5Sm₂O₃ : xAgNPs (where x= 0.00, 0.01, 0.02, 0.03, 0.04, and 0.05 % by mol) were prepared by the conventional melt quenching technique. The results show that the density and molar volume of glass are not dependent on AgNPs concentration. The absorption bands in NIR region are observed and located at 946, 1082, 1235, 1382, 1488, 1540, 1593 and 1959 nm. The luminescence spectra of the Sm³⁺ doped in glasses are observed at 563 (green), 600 (orange), 645 (red) and 707 (red) nm which are attributed to 4G_{5/2} → 6H_{5/2}, 4G_{5/2} → 6H_{7/2}, 4G_{5/2} → 6H_{9/2} and 4G_{5/2} → 6H_{11/2} transitions, respectively. Moreover, the luminescence intensity of all the emission bands is increased with AgNPs concentration up to 0.01 % mol. The effect of AgNPs concentration on luminescence intensity and decay time of glasses are also discussed.

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