Structural and optical studies of Rare earth-free Bismuth Silicate glasses for white light generation

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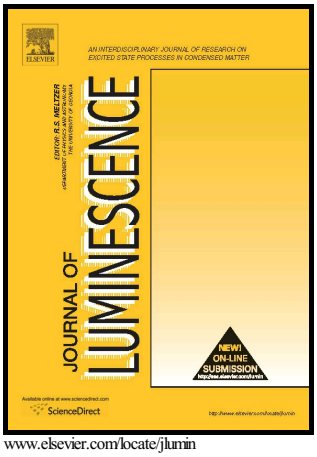

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Structural and optical studies of Rare earth-free Bismuth Silicate glasses for white light generation

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Abstract:

We report here rare-earth free bismuth silicate based oxyfluoride glasses (70-x) Bi_2O_3 $30SiO_2$ xMF (where M= Li, Na &K) with x=5, 20 & 30 mol % that realizes white light. Bismuth silicate glasses are prepared by melt quenching method and characterized by Raman, Fourier transform infrared (FTIR), UV-VIS absorption and emission techniques. From the structural analysis, Raman and FTIR, we are able to find presence of BiO_6 structural unit in the samples. Optical band gap values of present glass systems that are obtained from absorption spectra vary from 2.91eV to 3.21eV. Optical band gap values shows a correlation with theoretically calculated optical basicity values. Urbach energy calculated from absorption spectra gives a measure of disorder of present glass system. Quantitative description of Bi^{3+} ion interaction with silicate host lattice has been explored through Huang Rhys factor(S). The quality of white light emission is evaluated by CIE color matching function, color purity (CP) and correlated color temperature (CCT).

Keywords: Oxyfluoride glasses, Bismuth glasses, Raman, FTIR, Luminescence, white light, and Decay time