Spectroscopic properties of tellurite glasses co-doped with Er3+ and Yb3+

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Abstract.

Spectroscopic characterization of Er3+/Yb3+ co-doped tellurite glasses 70.8TeO2–5Al2O3–13K2O–(11−x)–BaO–0.2Er2O3–xYb2O3, where x=0, 0.4, 0.8, 1.2 and 2 mol% has been carried out through X-ray diffraction, Raman, absorption and luminescence spectra. The Judd–Ofelt intensity parameters were calculated for 0.2 mol% Er3+-doped glass and are used to evaluate radiative properties such as transition probabilities, branching ratios and radiative lifetime. The emission cross-section of the 4I13/2→4I15/2 transition has been calculated from the absorption data using McCumber′s theory. The emission intensity of both, visible and infrared signals as a function of Yb2O3, have been studied under 980 nm and 375 nm laser excitation. The physical mechanisms responsible for both, visible and infrared signals in the tellurite samples have been explained in terms of the energy transfer and excited state absorption process. The FWHM of the 4I13/2→4I15/2 transition as a function of Yb2O3 mol% and distance (δ) between the laser focusing point and the end-face of the glass has been reported. It was observed both, experimentally and numerically, a change in the FWHM with variations of δ less than 8 mm. The latter was attributed to the radiation trapping effect.