

Spectroscopic properties and Judd-Ofelt analysis of Er³⁺/Yb³⁺/Tm³⁺ doped tellurite glasses

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Absorption spectroscopy, refractive index and up-conversion luminescence of Er/Yb/Tm doped tellurite zinc glasses is reported. Tellurite zinc glasses were prepared by melt-quenching method and the nominal composition was (67-x-y)TeO₂-30ZnO-3Yb₂O₃-xTm₂O₃-yEr₂O₃ in mol% (x = 0, 0.2 and y = 0.03) and labelled as TZYb-100*x-100*y (TZYb-00-03, TZYb-20-00 and TZYb-20-03). The absorption spectra show the characteristic bands of each rare-earth ion and the most representative band is centred at 976 nm due to the large absorption cross section of the Yb and Er. The TZYb-20-03 glass was excited with 976 nm for up-conversion measurements at different excitation power, and the International Commission on Illumination 1931 (CIE-1931) chromaticity diagram coordinates were obtained. The nearest colour coordinates to the white centre is (0.325, 0.326), therefore this glass generates white light. The Judd-Ofelt parameters (Ω_2 , Ω_4 and Ω_6) for Er and Tm of all samples present the trend $\Omega_6/\Omega_4 < 1$. Such results shall be used to analyse the energy transfer process between rare earth ions in order to give a comprehensive explanation for white light generation.