Title: Spectroscopic investigation and Judd-Ofelt analysis of silver nanoparticles embedded Er3+-doped tellurite glass

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Abstract: A series of silver nanoparticles (NPs) embedded zinc-tellurite glass is prepared by melt-quenching technique. The transmission electron microscopic images reveal spherical as well as anisotropic silver NPs having average diameter in the range of 14-48 nm. The Er3+-free glass sample containing AgCl exhibits surface plasmon resonance (SPR) band of Ag NPs centered at ~ 501 nm. From Judd-Ofelt analysis, it is found that by increasing the concentration of NPs, the value of O2 is enhanced suggesting increased covalency and decreased symmetry around the Er3+ ions. Integrated emission cross-section (IEC) is enhanced as the concentration of silver NPs is increased up to 0.5 mol% AgCl. Fourier infrared spectra show that the intensity of the vibrational band of the water molecule and fundamental stretching band of OH group are suppressed. Furthermore, under an excitation wavelength of 786 nm, three prominent upconversion emissions are observed at 520 nm, 550 nm and 650 nm which are attributed to 2H11/2, 4I15/2, 4S3/2 , 4I15/2, and 4F9/2 , 4I15/2 transitions, respectively. The upconversion emissions are enhanced significantly by introduction of silver NPs. The enhancement is mainly attributed to the local field effect of silver NPs. Studied nanocomposites are potential candidates for the development of solid state lasers.