

## Up-Conversion Enhancement In Er<sup>3+</sup>-Ag Co-Doped Zinc Tellurite Glass: Effect Of Heat Treatment

### Abstract

The melt quenching method was used to synthesize the Ag<sup>0</sup> nanoparticles and Er<sup>3+</sup> ions co-doped zinc tellurite glass. The glasses were characterized by differential thermal analyzer, UV-VIS-IR absorption, photoluminescence spectroscopy and TEM imaging. Heat treatment at different annealing time intervals above the glass transition temperature was applied to reduce the Ag<sup>+</sup> ions to Ag<sup>0</sup> NPs. The influence of heat treatment on structural and optical properties is examined. Intense and broad up-conversion emissions of silver are recorded in the visible region. Up-conversion luminescence spectra revealed three major emission peaks at 520, 550 and 650 nm originating from <sup>2</sup>H<sub>11/2</sub>, <sup>4</sup>S<sub>3/2</sub> and <sup>4</sup>F<sub>9/2</sub> levels, respectively. An efficient enhancement in visible region is observed for samples containing silver NPs. The absorption plasmon peaks are evidenced around 560 and 594 nm. The effect of localized surface plasmon resonance and the energy transfer from the surface of silver NP to trivalent erbium ions are described as the sources of enhancement. © 2012 Elsevier B.V. All rights reserved.