

Sliver Nanoparticles Enhanced Visible and Near Infrared Emission of Er³⁺ Ions Doped Lithium Tungsten Tellurite Glasses

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Abstract : TeO₂-WO₃-Li₂O glass doped erbium ions (1mol %) and embedded silver nanoparticles(Ag NPs) has successfully been prepared by melt quenching technique and increasing the heat-treatment duration. The amorphous nature of the glass is determined by X-ray diffraction method, and the presences of silver nanoparticles are confirmed using Transmission Electron Microscopy analysis. TEM image reveals that the Ag NPs are dispersed homogeneously with average size 18 nm. From the UV-Vis absorption spectra, the surface plasmon resonance (SPR) peaks are detected at 550 and 578 nm. Under 980 nm excitation wavelengths, enhancement of red upconversion fluorescence and near-infrared broadband emission around 1550nm of Er³⁺ ions doped tellurite glasses containing Ag NPs have been observed. The observed enhancement of Er³⁺ emission is mainly attributed to the local field effects of Ag NPs causes an intensified electromagnetic field around NPs. For observed enhancement involved mechanisms are discussed.

Keywords : erbium ions, silver nanoparticle, surface plasmon resonance, upconversion emission

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