

## Abstract

The thermoluminescence (TL) properties of Manganese (Mn) doped ZnS nanophosphors were investigated after gamma irradiation at room temperature. The ZnS:Mn nanophosphors were prepared by chemical precipitation method by using Zinc sulfate, Sodium sulfide and Manganese sulfate. 1 mole, 2 moles and 3 moles of Manganese sulfate were used to have different concentrations of Mn in doped ZnS. The formation of the nanophosphors was characterized by high resolution scanning electron microscopy FESEM, XRD and EDX. The obtained products consist of particles with the dimension about 85–150nm. Comparison between ZnS nanophosphors and commercial ZnS powder glow curves was studied. It was observed that the TL intensity increased with a decrease in the size of particles. The glow curve has one TL peak which is centered at about  $250^{\circ}C$  for a heating rate of  $5^{\circ}C/s$  in the temperature range from  $50^{\circ}C$  to  $400^{\circ}C$ . The dose response and fading process were examined and it was observed that the TL response continuously increases linearly with increasing dose in the investigated range of dose levels. The TL properties of Mn doped ZnS with 2 mole of Manganese sulfate was observed to be the best comparing with other Manganese sulfate concentrations which were used. For ZnS with 2 mole of Mn the TL response lose approximately 40% of it is original intensity after one day storage in the dark at room temperature.