

Abstract

The synthesis of (Cr, Ni) co-doped ZnO nanoparticles was done by sol-gel technique. The structural, optical, morphological and electronic study were done by X-ray diffraction, FTIR, SEM and IV results. The crystal size was decreased due to co-doped ZnO which shows the agreement between Cr, Ni and Zn ions. With increase in doping concentration the crystal size was enhanced which was due to mismatch of ionic radius of doped and host material. FTIR results also confirmed the formation of ZnO. Its also indicate the presence of defect state in ZnO nanostructures due to doping of transition metal as well as presence of some intrinsic defect i.e Zn interstitial, oxygen vacancy etc. SEM results also in well agreement with XRD, shows that with increase in doping concentration the particle size was enhanced due to agglomeration. IV results show that pure ZnO shows excellent conductivity at room temperature. But due to doping its conductivity decreases. In case of co-doping it shows higher conductivity as compared to singly doped samples. The reduction of electronic properties was due to increase in defect scattering by addition of transition metal elements in ZnO. Free electron from the donor level are trapped by divalent or trivalent ions, results in decrease in n-type donor carrier concentration and increase in resistivity. The small amount of transition metal doped ZnO depress the carrier concentration making ZnO higher resistivity.