Optical and electrical properties of ZnO:Sn powder prepared by the liquid drop fluidized reactor

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Optical and electrical properties of ZnO:Sn powder prepared by the liquid drop fluidized reactor were investigated to develop the sensor material. The powder of ZnO:Sn could be prepared continuously, and the injection of micro bubble into the reactor could lead to the effective fluidization of the liquid drops in the reactor. The main peak of XRD pattern shifted to the low angle indicating that Sn^{4+} ion was doped successfully into the ZnO lattice. The crystallite size of ZnO:Sn decreased with an increase in the content of Sn doped into the host material of ZnO, since the dopant suppressed the crystal growth. The doping of Sn into ZnO resulted in the decrease in the band gap energy by forming the metastable energy level within the band gap, which was manifested by means of diffuse reflectance spectra (DRS) and photoluminescence spectra(PL) of ZnO:Sn. The surface morphology as well as lattice micro structure of as-prepared powder could be modified by doping of Sn into ZnO. The doping of Sn into ZnO could lead to the interfacial zinc vacancies and thus oxygen vacancies with trapped states, which could enhance the electrical properties of as-prepared ZnO:Sn powder.