

Characteristics of Sn doped ZnO powders in a micro drop reactor

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Highly porous and nano-structured Sn doped ZnO powders were prepared in a micro drop reactor, for development of semiconductor type gas sensor. The micro drop reactor could improve the production efficiency of as-designed powders by adjustment of reaction condition such as residence time of micro drops in the reaction zone and contacting efficiency of micro drops and bubbles. The composition ratio of Zn and Sn in the precursor solutions could be maintained in the as-prepared powders. The XRD patterns of ZnO:Sn confirmed that single phase ZnO:Sn with high crystallinity was prepared, despite the presence of additives in the polymeric as well as aqueous precursor solutions. The donor of Sn was successfully doped into the host lattice of ZnO which could produce the electron defects in order to increase the influence of oxygen partial pressure on conductivity of powders. It was revealed that the change of electron configuration of ZnO by doping Sn component was one of the key effects to increase the sensitivity for gas sensing. The polymeric additives did not affect the lattice structure, ionic substitution or electron configuration in the host material. The size of prepared powders was reduced effectively and the porosity and effective surface area of as-prepared powders.