Preparation of porous SnO_2:Ga nano powder in a micro drop/bubble fluidized reactor

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SnO_2 has been understood as one of promosing materials to be developed as gas sensing materials by detecting several gases in various different processes. The gas sensing material should have wide surface area to detect the extremely dilute gas. The size of powder should be reduced, in addition to the increase in the porosity, to increase in the effective surface area of the powder. Thus, SnO_2 powder were prepared in a MDBFR, in which the powder could be prepared continuously and effectively. To control the microstructure of SnO_2, Ga^{3+} was doped into the lattice of host material. The prepared SnO_2:Ga were analyzed by means of SEM, XRD, DRS and BET. The XRD analysis of as-prepared powder confirmed that the powder were mainly single crystal structures of SnO_2:Ga, regardless of doping level. The size of SnO_2:Ga was in the range of 10~50 nm depending on the preparation conditions, which were easily controlled by adjusting the flow rates of micro drops and bubbles in the reactor. The XRD and DRS analyses indicated that Ga^{3+} was successfully doped into SnO_2 lattice. The crystallite size of as-prepared SnO_2:Ga decreased with increasing the amount of Ga^{3+} dopant. It was indicated that the as-prepared SnO_2:Ga were spherical and wrinkled with a furrowed surface.