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Fabrication of Au@SnO_2 NPs mixed SnO_2 composite and its sensing behavior for CO gas

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In this report a core shell material Au@SnO_2 (0.03 M Au colloid) core shell nanoparticles (NPs) has been synthesized by microwave synthesis method. However in this Au@SnO_2 core shell NPs the high resistance restricts the commercial value. Hence to overcome this issue, we prepared a mixture of Au@SnO_2 core shell NPs and SnO_2 powder which was prepared by $SnCl_4$ (0.28 M), $(NH_4)_2CO_3$ (0.1 M) and NH_4OH (1.6 M NH_3) as initial precursors. The prepared SnO_2 powder was calcined at different temperatures of 500°C, 600°C, and 700°C. From TEM images, the particle sizes were found to be 15 nm, 20 nm, 30 nm respectively. XRD measurements show the well crystallinity of all the prepared SnO_2 powders at different calcined temperatures. The surface morphology of as prepared SnO_2 powders was examined in FESEM. The amount of SnO_2 powders were fixed at 0.5 g, whereas the mixing amount of Au@SnO_2 NPs was varied from 50 to 100 µL. The sensing properties of Au@SnO_2 NPs mixed SnO_2 composite for CO gas (200 to 1000 ppm) were examined at testing temperature of 200°C. When the amount of Au@SnO_2into SnO_2 powder increases, the resistance of Au@SnO_2 NPs mixed SnO_2 composite device increase. The response of Au@SnO_2 NPs mixed SnO_2composite sensor was found to be 8.78 and 6.82 for 50 µL and 100 µL of Au@SnO_2 core-shell NPs amount respectively.

Biography

Bum-Soo Chon is pursuing his Master degree in Department of Information and Electronics Materials Engineering, Chonbuk National University. He is interested in the synthesis of core-shell nanostructures and nanopowder such as Au@SnO_2, SnO_2 powder and their applications for gas sensor.

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