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Fabrication of hierarchical flowerlike zinc stannate thin film and its application as liquefied petroleum gas sensor

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In the present study an effort has been made to develop a LPG sensor using hierarchical flowerlike zinc stannate architecture as the sensing material which may detect a leakage of small amount of LPG at room temperature. A convenient precursor-calcination strategy was used to fabricate the hierarchical flowerlike zinc stannate architectures by sol-gel spin coating process. X-ray diffraction analysis confirmed its formation with minimum crystallite size ~ 7 nm. The particle size distribution was obtained with the help of acoustic spectroscopy using acoustic particle sizer (APS-100). It is observed that the surface has a hierarchical microstructure, interlaced by a large quantity of micro-sheets. It reveals that the product has a highly dendritic and loose structure having a number of gas adsorption sites. Further, the fabricated thin film was investigated with the exposition of liquefied petroleum gas (LPG) at room temperature (25 °C). The maximum value of the sensitivity of the sensor was found 2.5. The response and recovery times were found ~ 180 and 240 s respectively. Maximum percentage sensor response of the sensor was 143. The gas sensing characteristics showed a linear behaviour with increasing the concentration of the LPG. Improved sensitivity and percentage sensor response, small response time, and good reproducibility identifies that the fabricated LPG sensor is challenging for the detection of LPG at room temperature. Such an efficient approach realized a new pathway to produce porous hierarchical nanostructures as sensorial material.

Biography

Satyendra Singh has completed his Ph.D. at the age of 28 years from University of Lucknow, Lucknow, India. Currently he is a D.S. Kothari Post Doctoral Fellow in Department of Physics, University of Allahabad, Allahabad. He has published 26 papers in reputed international journals. His research topic is "Synthesis and Characterization of Polymer Nanocomposites and their Applications in Gas and Humidity Sensors".

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