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Fabrication of highly sensitive ammonia chemi-sensor based on solvothermally prepared CuO-doped ZnO nanomaterials

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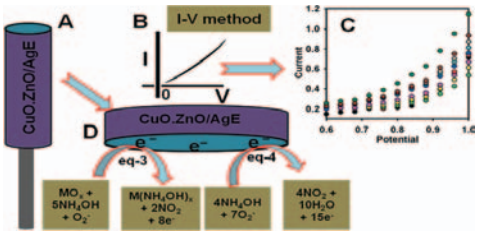
Due to numerous potential applications of semiconductor transition metal–doped nanomaterials and the great advantages of solvothermal synthesis in both cost and environmental impact, a significant effort has employed for growth of copper oxide co-doped zinc oxide (CuO co-doped ZnO) nanostructures via hydrothermal route at room conditions. The structural and optical properties of the CuO co-doped ZnO nanorods were characterized using various techniques such as UV/visible, FT-IR spectroscopy, XRD, and FE-SEM etc. The sensing performance has been executed by simple and reliable I-V technique, where aqueous ammonia is considered as a target analyte. CuO co-doped ZnO nanorods of thin-film with conducting coating agents on silver electrodes (AgE, surface area 0.0216 cm^2) displayed good sensitivity, stability, and reproducibility. The calibration plot is linear over the large dynamic range, where the sensitivity is approximately 1.549 ± 0.10 $\mu Acm^{-2}mM^{-1}$ with a detection limit of 8.9 ± 0.2 μM, based on signal/noise ratio in short response time. Hence on the bottom of the perceptive communication between structures, morphologies, and properties, it is displayed that the morphologies and the optical characteristics can be extended to a large scale in transition-metal-doped ZnO nanomaterials and efficient chemical sensors applications.



Biography

Mohammed M. Rahman received his PhD degree last 2007 on Electrochemistry under the School of Natural Science, Chonbuk National University, Korea. He has successfully completed two years post-doctoral research fellowship in Pusan National University (2007/2008, South Korea) and Toyohashi University of Technology (2008/2009, Japan) respectively. Recently he completed two year contract as assistant professor in the chemistry department and CAMNE, Najran University, KSA (2009/2011). Presently, he is working as an assistant professor in the chemistry department & CEAMR, King Abdulaziz University, KSA since 2011. His current research interest is focused in the fields of Nano-technology, Sensors, and Micro-devices, Nano-materials and Nano-composites.

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