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Synthesis and screen-printing of SnO2 nanoparticles on flexible PET substrate for cost-efficient ethanol sensors

Marko Radovic
BioSense Institute, University of Novi Sad, Serbia

The presented research is a bottom-up approach involving synthesis, characterization and application of SnO2 nanomaterials in advanced technologies such as ethanol gas sensing. Tin oxide nanoparticles were synthesized with hydrothermal method, followed by calcination in ambient conditions at 550C. Characterization of structural properties with X-ray diffraction (XRD) technique revealed that synthesized sample has rutile crystal structure with crystallite size in nanometer range. SEM images of prepared sample unveiled that SnO2 nanopowders consist of spherical nanoparticles which are composed of agglomerated crystalls. Synthesized powder was screen-printed on flexible polyethylene terephthalate (PET) substrate with Ag interdigitated electrodes (IDE) for electrical measurements and integration in sensor platforms. Electrical characterization in DC regime revealed that SnO2 sample has very good conductivity for oxide material. The Cole-Cole plots, extracted from AC measurements, exhibited single semi-circle characteristic for grain boundary conduction. Gas sensing performance was evaluated at room temperature through detection of ethanol vapor. The obtained results indicated that synthesized and screen printed SnO2 nanoparticles have good and stable sensitivity with linear dependence on the concentration of target gas. The utilized multidisciplinary approach offers a very good alternative to fabrication of chemical gas sensors which are functionalized on rigid and expensive platforms like silicon or ceramics.

Biography

Marko Radovic has completed his PhD from Faculty of Physics at University of Belgrade, Serbia. He has published more than 20 papers in reputed journals.

marrad@biosense.rs

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