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Effect of Sm doping on the structural and optical properties of ZnO nanorods grown by chemical bath deposition

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Recently, one-dimensional (1D) semiconductor such as nanowires, nanobelts, nanorods and nanotubes have attracted much interest due to their unique properties and potential use in a wide range of device such as single electron transistor [1], photodiodes [2] and sensing applications [3]. 1D structures of ZnO with a wide band gap (3.37 eV) and large exciton energy (60 meV) at room temperature have been studied intensively [4]. The electrical and optical properties of ZnO can be enhanced by doping it with some cations. For example, rare-earth (RE) elements are usually used as a cations in some of the host materials, due to their high fluorescence efficiencies [5]. Here, we report on the synthesis and characterization of RE samarium (Sm) doped ZnO nanorods with doping concentration ranging from 0 to 8 at.%. These nanorods were synthesized and deposited on an indium tin oxide (ITO) substrates using chemical bath deposition method at low temperature (85 - 90) ° C. The as-synthesised ZnO and Sm doped ZnO were characterized at room temperature using X-ray diraction spectroscopy (XRD) and scanning electron microscopy (SEM). Results from XRD pattern and SEM revealed that the ZnO nanords have the wurtzite crystal structure. Furthermore, results from photoluminescence spectroscopy, UV-visible spectroscopy and Raman spectroscopy as well as X-ray photoelectron spectroscopy will be described in more detail.

References
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and his / her institution

Jackie Nel
Jackie.Nel@up.ac.za
University of Pretoria

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Primary author: Mr AHMED, MUSTAFA (MAM AHMED)

Co-authors: Dr NEL, Jackie (JM Nel); Prof. MEYER, Walter (WE Meyer)

Presenter: Mr AHMED, MUSTAFA (MAM AHMED)

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