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Sythesis and Characterization of NiO thin films and nano-structures for gas sensing applications

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NiO thin films were deposited at different temperatures (RT,100, 200, 350 and 450 degree Celsius) using a direct current (DC) sputtering system and then nickel oxide nano-structures were synthesized on the deposited NiO film using hydrothermal method. The thin films and nano-structures were subjected to various characterization techniques (X-ray diffraction, Rutherford Back scattering Spectroscope, Raman, UV-Visible, Scanning Electron Microscope, X-ray Photo electrons Spectrometer). The thin films deposited were found to be non-crystalline containing amorphous phases. The deposition temperature was found to have no effect on the film thickness, since all films deposited at different temperatures were found to have the same thickness of 25nm, with uniform distribution of particles on the surface as observed on the Scanning electron microscope (SEM). These NiO thin films were deposited for duration of 1 hour. XPS was used to investigate the presence of Nickel and Oxygen and their oxidation states in as-deposited samples. Gas sensing properties of NiO films and nano-structures were tested on Nitric oxide(NO) gas as analyte, using kenosis Tec gas sensing station.Repeatability and sensitivity of NiO gas sensor was investigated. Short response of 1.5 minutes and recovery times of 1.5 -5.1 minutes were observed on nano-structures compare to thin films.

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Yes

Level for award
 (Hons, MSc,
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MSc

Primary author: Mr MKWAE, Prince (University of Zululand)

Co-authors: Dr NDLANGAMANDLA, Ceboliyazakha (University of Zululand); Prof. NDWANDWE, Muzi (University of Zululand); Dr NKOSI, Steven (University of Zululand)

Presenter: Mr MKWAE, Prince (University of Zululand)

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