

Semiconductor metal oxides (SMO)

heterostructure for gas sensing

application



Prof. Motaung research interests include:

- Design, synthesis and characterization of various n-type and p-type and mixed semiconductor metal oxides (SMO) heterostructure for gas sensing application
- Luminescence characteristics of SMO in sensing performance
- Investigation of selective p-n, n-n, p-p or n- response inversion in gas sensing
- Study the effect of SMO crystals with vastly reactive facets for gas selectivity
- Fabrication of organic-inorganic photovoltaic solar cells based devices.
- Preparation of SMO based materials for photocatalysis application
- Most importantly, the research work seeks to translate the laboratory research fundamentals into innovative and society impactful prototype products that can be utilized in the daily life of the humankind.

Postdoctoral fellows

- **Dr. Zamaswazi Tshabalala**, Postdoctoral Fellow
- **Dr. Teboho P. Mokoena**, Postdoctoral Fellow

Current PhD Students

1. **Ms. Rethabile Makole**

Thesis Title: The use of down-converting phosphor layer to improve the power conversion of conventional solar cell and their application as self-powered gas sensors

2. Ms. Malindisa Ramokone

Thesis Title: Selective detection of ethanol vapour sensing characteristics manifested by p-n heterostructures of NiO and SnO₂: decoration of noble metal nanoparticles as low-power consumption sensor.

3. Ms. Dineo Anna Bopape

Thesis Title: Removal of Organic Dyes from Textile WasteWater using Green Synthesised Metal Oxide Heterostructures Decorated Carbon-based Nanomaterials.

4. Mr. Aaron Malape

Thesis Title: Fabrication of Low Power Consumption Based Gas Sensor using CeO₂ loaded with p-type Metal Oxide to form n-p Heterostructure for Detection of NH₃ and C₂H₅OH Gases.

Current MSc Students

1. Ms. Ongezwa Mnethu

Thesis Title: Synthesis and Characterization of CuO Gas Sensing Application.

2. Ms. Boiketlo Thamaga Thesis Title: Selective Detection of VOCs Utilizing P-N Junction of NiO and CeO₂ Based Sensor for Low Temperature Performances.

3. Mr. Mashaole S. Mamabolo

Thesis Title: The Efficient Design Towards Highly Low/Self-Powered Gas Sensors.

4. Mr Lekgolo M Maebana

Thesis Title: Efficient Design Towards Highly Selective NO₂ Low-Powered Gas Sensor.

5. Mr. Lanneth Mabunda

Thesis Title: Development of Low Temperature Gas Sensing for Detection of VOCs and CH₄ using CeO₂-TiO₂ Heterostructure.

6. Mr. Aubrey Makofane

Thesis Title: Photo-degradation of Dyes from Waste Water Using a Ag Loaded Metal Ferrites Nanoparticles Deposited on Carbon Nanospheres.

7. Mr. Stanley Mashaba

Thesis Title: Fabrication of ZnO-SnO₂ Heterostructure for Enhanced Nitrogen Dioxide and Ethanol Sensitive Performances at Room Temperature.