



RHODES UNIVERSITY, MAKHANDA, SOUTH AFRICA



**MR NANDE MGEDLE (POSTDOCTORAL FELLOW)
SUPERVISOR: PROFESSOR JOHN MACK**

CONTACT DETAILS:

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EDUCATION DETAILS:

PhD (Chemistry) 2025 – University of Johannesburg, South Africa
MSc (Chemistry) 2020 – Vaal University of Technology, South Africa
BTech (Chemistry) 2017 – Vaal University of Technology, South Africa
National Diploma (Analytical Chemistry) 2015 – Walter Sisulu University, South Africa

CURRENT RESEARCH:

Synthesis of novel water-soluble porphyrinoids (BODIPYs, azaBODIPYs, porphyrins, chlorins and N-confused porphyrins) and their gold and silver nanoparticle conjugates.

OTHER RESEARCH INTEREST:

- **Photodynamic Therapy (PDT) and Photothermal Therapy (PTT):** Researching the use of light-activated agents for medical treatments, particularly in cancer therapy, focusing on the development of effective photosensitizers and strategies for improving treatment outcomes.
- **Nanotechnology:** Exploring the development and application of nanoscale materials and systems in various fields, with a focus on their role in enhancing chemical processes and environmental sustainability.
- **Water Treatment:** Investigating novel materials and methods for water purification, particularly through the use of advanced chemical processes to address global water quality challenges.
- **Catalysis:** Studying the mechanisms and applications of catalytic reactions, particularly in the context of environmental cleanup and sustainable chemistry.
- **Optical Sensors:** Developing and applying nanomaterials for sensitive and selective detection of heavy metals and organic contaminants in water sources.

WORK EXPERIENCE:

TEACHING EXPERIENCE

03/2021- 11/2024 Laboratory Chemistry tutor/assistant, University of Johannesburg

- Monitor undergraduate students during experiments to ensure health and safety rules are adhered.
- Invigilate during tests and exams.
- Attend to student questions, mark and record laboratory report marks.

03/2017-12/2019 Laboratory Chemistry assistant, Vaal University of Technology

- Assisting B-Tech students in data analysis, preparing presentations using PowerPoint and compiling research reports.
- Monitor undergraduate students during experiments to ensure health and safety rules are adhered.
- Assisting undergraduate students in operating FTIR, AAS, centrifuge machine and UV-vis spectroscopy.

02/2015-12/2015 Educator, Fort Malan Senior Secondary School

- Taught daily classes in Mathematics and Physical Sciences (Grade 10, 11 and 12).
- Taught Natural Science in Grade 9 and Mathematics in Grade 8.
- Lesson plans, set examination papers and memorandums.

STUDENT SUPERVISION AND MENTORING

03/2021- Dec 2024 *Supervision and mentoring, University of Johannesburg*

- Supervised and mentored six undergraduate students in their final year research/internship projects, guiding them through the research process from literature review to data analysis.
- Assist them in operating instruments, data collection and analysis.
- Provided regular one-on-one meetings to discuss research progress, troubleshoot challenges, and offer academic guidance, ensuring high-quality outcomes and adherence to deadlines.
- Encouraged critical thinking and independence in students, fostering a positive and productive research environment.

03/2017-12/2019 *Supervision and mentoring, Vaal University of Technology*

- Supervised and mentored six B-Tech students in their research projects, assisting with project formulation, methodology selection, data collection and analysis and academic writing.
- Assisted in the development of research proposals and funding applications, ensuring alignment with departmental and institutional standards.
- Provided regular one-on-one meetings to discuss research progress, troubleshoot challenges, and offer academic guidance, ensuring high-quality outcomes and adherence to deadlines.
- Fostered an inclusive, supportive learning environment by addressing students' academic concerns and personal challenges.
- Provided advice on study techniques, time management, and balancing academic workloads with personal responsibilities, contributing to students' overall well-being and success.
- Encouraged critical thinking and independence in students, fostering a positive and productive research environment.

OTHER EXPERIENCE

02/2024-06/2025 *Laboratory Captain, University of Johannesburg*

- Develop and implement safety protocols.
- Monitor compliance and inform new personnel.
- Conduct hazard assessments and manage hazardous materials.
- Ensure equipment safety.
- Maintain documentation and report safety issues, record and order chemicals.
- Supervise laboratory personnel and foster a culture of safety.

06/2020-06/2025 *X-ray Diffraction Scientific Specialist, University of Johannesburg*

- Perform routine XRD scans and ensure accurate measurements of samples.
- Analyze diffraction patterns to determine material properties, such as crystal structure, phase identification, and stress/strain analysis.
- Prepare and process samples for XRD analysis.
- Ensure the samples are properly handled and stored to prevent contamination.
- Process and interpret diffraction data using specialized software.
- Perform routine maintenance on XRD equipment to ensure its proper function.
- Troubleshoot and resolve any equipment malfunctions or issues during analysis.
- Keep track of equipment calibration and perform necessary adjustments.
- Maintain detailed records of analysis procedures, sample preparation methods, and results.
- Ensure compliance with environmental and safety regulations related to X-ray analysis.
- Document any issues or deviations encountered during experiments.
- Train new students on how to operate the instrument.

PUBLICATIONS:

1. Machine Nivonile Angelina, Olufunto Tolulope Fanoro, Yanga Mhlantlalala, Rodney Maluleke, **Nande Mgedle**, Olivier Joubert, Thabang Calvin Lebepe, and Oluwatobi Samuel Oluwafemi. (2025). Synthesis of blue emitting Aloe-Gold nanoclusters and their molecular Binding, antibacterial and cytotoxicity Profiling. *Inorganic Chemistry Communications*, 173: 113903. <https://doi.org/10.1016/j.inoche.2025.113903>. DoHET ACREDITED.
2. Gracia It Mwad Mbaz, Thabang Calvin Lebepe, Rodney Maluleke, Akiyoshi Obonai, **Nande Mgedle**, Olanrewaju A. Aladesuyi, Rajendran Kalimutu, Tetsuya Kodama, Atsuki Komiya, and Oluwatobi Samuel Oluwafemi. (2024). Photothermal Depth Profiling of Gelatin-Stabilised Gold Nanorods-Trastuzumab Conjugate as a Potential Breast Cancer Photothermal Agent. *Journal of Inorganic and Organometallic Polymers and Materials*, 34: 5491-5502. <https://doi.org/10.1007/s10904-024-03151-y>. DoHET ACREDITED.
3. Jibrin Fatima, Olufunto Tolulope Fanoro, Rodney Maluleke, Thabang Calvin Lebepe, **Nande Mgedle**, Gracia It Mwad Mbaz, Olanrewaju A. Aladesuyi, Rajendran Kalimuthu, Oluwatoyin A. Odeku, and Oluwatobi Samuel Oluwafemi. (2024). Biosynthesis, Characterization, and Antibacterial Activity of Gold, Silver, and Bimetallic Nanoparticles Using *Annona squamosa* L. Leaves. *Antibiotics* 13, 12: 1199. <https://doi.org/10.3390/antibiotics13121199>. DoHET ACREDITED.
4. **Nande Mgedle**, and Oluwatobi Samuel Oluwafemi. (2024). Instant Degradation of Organic Dyes in Contaminated Rivers Using Iron-Doped Zinc Quaternary-Based Quantum Dots Nanocatalyst. *Reactions*, 5: 999-1012. <https://doi.org/10.3390/reactions5040052>. DoHET ACREDITED.
5. Ncapayi Vuyelwa, Oladoyin Famutimi, Thabang Calvin Lebepe, Rodney Maluleke, Sam Masha, **Nande Mgedle**, Sundararajan Parani, Tetsuya Kodama, Isaac Olusanjo Adewale, and Oluwatobi Samuel Oluwafemi. (2023). Large-scale synthesis of ClSe/ZnS core-shell quantum dots and its effects on the enzymatic activity of recombinant human furin (an activator of SARS-COV-2 S1/S2 spike proteins). *Colloid and Interface Science Communications*, 56: 100737. <https://doi.org/10.1016/j.colcom.2023.100737>. DoHET ACREDITED.
6. **Nande Mgedle**, Olanrewaju A. Aladesuyi, Thabang Calvin Lebepe, Vuyelwa Ncapayi and Oluwatobi Samuel Oluwafemi (2023). Facile aqueous synthesis of ZnCuInS/ZnS–ZnS QDs with enhanced photoluminescence lifetime for selective detection of Cu(ii) ions. *Green Processing and Synthesis*, 12: 20228155. <https://doi.org/10.1515/gps-2022-8155>. DoHET ACREDITED.
7. Lebepe, Thabang Calvin, Rodney Maluleke, **Nande Mgedle**, and Oluwatobi Samuel Oluwafemi. (2023). Porphyrin as a Cryoprotectant for Graphene Oxide-Coated Gold Nanorods to Produce Conjugated Product with Improved Stability and Opto-Phototherapeutic Properties. *Pharmaceutics* 15: 2538. <https://doi.org/10.3390/pharmaceutics15112538>. DoHET ACREDITED.
8. Olufunto Tolulope Fanoro, Sundararajan Parani, Rodney Maluleke, Thabang Calvin Lebepe, Rajendran J. Varghese, **Nande Mgedle**, Vuyo Mavumengwana, and Oluwatobi Samuel Oluwafemi. (2021). Biosynthesis of smaller-sized platinum nanoparticles using the leaf extract of *Combretum erythrophyllum* and its antibacterial activities. *Antibiotics*, 10: 1275.

<https://doi.org/10.3390/antibiotics10111275>. DoHET ACREDITED.

9. Gbenga Mike Peleyeju, **Nande Mgedle**, Elvera Viljoen., Mike Scurrrell, & Sekhar Chandra Ray. (2021). Irradiation of Fe–Mn@ SiO₂ with microwave energy enhanced its Fenton-like catalytic activity for the degradation of methylene blue. *Research on Chemical Intermediates*, 47: 4213-4226. <https://doi.org/10.1007/s11164-021-04526-3>. DoHET ACREDITED.

CONFERENCE PRESENTATIONS:

10/2024 - Synthesis of Fe doped quaternary quantum dots -porphyrin conjugates as a promising tool for cancer Phototherapy. South Africa, France, Nigeria, and Japan Quadrilateral Conference, University of Johannesburg, Gauteng, South Africa, **Oral presentation**.

10/2024 - Facile aqueous synthesis of ZnCuInS/ZnS–ZnS QDs with enhanced photoluminescence lifetime for selective detection of Cu(II) ions. NanoAfrica conference, SunCity, North West, South Africa, **Oral presentation**.

09/2019 - The effect of Fe/Mn mass ratio on a bimetallic oxide heterogeneous catalyst supported on silica for the degradation of methylene blue. The ANSO-MMU-SAJOREC international conference, Maasai Mara University, Narok County, Kenya, **Oral presentation**.

12/2018 - The effect of Fe/Mn mass ratio on a bimetallic oxide heterogeneous catalyst supported on silica for the degradation of methylene blue. The 43rd SACI National Convention, CISR– ICC, Pretoria, Gauteng, South Africa, **Oral presentation**.

11/2018 - Bimetallic catalyst calcined by microwave and conventional methods (oven) for the Fenton reaction. South African Nanotechnology Initiative (SANI), Vaal University of Technology Quest Conference Center, Vanderbijlpark, Gauteng, South Africa, **Oral presentation**. Received second best presenter award.

11/2017 - The use of bimetallic oxide heterogeneous catalyst for the Fenton reaction. The 28th annual conference of the Catalysis Society of South Africa (CATSA), Kwa Maritane Bush Lodge, Pilanesberg, North West, South Africa, **Poster presentation**.

INTERNATIONAL RESEARCH VISITS:

10/2023-12/2023

Tohoku University (Japan)

- Training on single cell analysis.
- Training on In-Vitro experiments and Cell viability studies.

AWARDS AND HONORS:

11/2018 - Received second best presenter award at SANI conference.

02/2019 - President of Post Graduate Student Association.