



## RHODES UNIVERSITY, MAKHANDA, SOUTH AFRICA

### STUDENT INFORMATION



**MS AZOLE SINDELO (DOCTORAL STUDENT)**

**STUDENT NO: 12S1263**

**SUPERVISOR: DISTINGUISHED PROFESSOR TEBELLO NYOKONG**

#### **CONTACT DETAILS:**

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#### **EDUCATION DETAILS:**

PhD (Chemistry) currently - Rhodes University, Makhanda, South Africa  
MSc – with distinction (Chemistry) 2018 - Rhodes University  
BScH (Chemistry) 2015 - Rhodes University  
BSc (Chemistry and Biochemistry) 2014 - Rhodes University

#### **RESEARCH TITLE/PROJECT:**

Developments on conjugates of phthalocyanines with magnetic nanoparticles for photodynamic antimicrobial therapy

## **PUBLICATIONS:**

1. Sindelo, Azole; Osifeko, Olawale L.; Nyokong, Tebello  
Synthesis, photophysical and photodynamic antimicrobial chemotherapy studies of indium pyridyl phthalocyanines: Charge versus bridging atom  
**Inorganica Chimica Acta (2018), 476, 68-76**  
DOI:10.1016/j.ica.2018.02.020  
<https://doi.org/10.1016/j.ica.2018.02.020>
2. Francis Chindeka, Philani Mashazi, Jonathan Britton, Gertrude Fomo, David O. Oluwole, **Azole Sindelo**, Tebello Nyokong  
Optimizing phthalocyanine based dye-sensitized solar cells: The role of reduced graphene oxide  
**Synthetic Metals 246 (2018) 236–245**  
DOI: 10.1016/j.synthmet.2018.10.021  
<https://doi.org/10.1016/j.synthmet.2018.10.021>
3. Sindelo, A., Kobayashi, N., Kimura, M. and Nyokong, T.  
Physicochemical and photodynamic antimicrobial chemotherapy activity of morpholine-substituted phthalocyanines: Effect of point of substitution and central metal  
**Journal of Photochemistry and Photobiology, A: Chemistry (2019), 374, 58-67**  
DOI:10.1016/j.jphotochem.2019.01.025  
<https://doi.org/10.1016/j.jphotochem.2019.01.025>
4. Nene, L.C., Managa, M.E., Oluwole, D.O., Mafukidze, D.M., Sindelo, A. and Nyokong, T.  
The photo-physicochemical properties and in vitro photodynamic therapy activity of differently substituted- zinc (II)-phthalocyanines and graphene quantum dots conjugates on MCF7 breast cancer cell line  
**Inorganica Chimica Acta (2019), 488, 304-311**  
DOI:10.1016/j.ica.2019.01.012  
<https://doi.org/10.1016/j.ica.2019.01.012>
5. Mafukidze, Donovan M.; Sindelo, Azole; Nyokong, Tebello  
Spectroscopic characterization and photodynamic antimicrobial chemotherapy of phthalocyanine-silver triangular nanoprism conjugates when supported on asymmetric polymer membranes  
**Spectrochimica Acta, Part A: Molecular and Biomolecular Spectroscopy (2019), 219, 333-345**  
DOI:10.1016/j.saa.2019.04.054  
<https://doi.org/10.1016/j.saa.2019.04.054>
6. Sindelo Azole; Nyokong Tebello  
Magnetic nanoparticle - indium phthalocyanine conjugate embedded in electrospun fiber for photodynamic antimicrobial chemotherapy and photodegradation of methyl red  
**Heliyon (2019), 5(8), 1-8, Article Number e02352**  
DOI: 10.1016/j.heliyon.2019.e02352  
<https://doi.org/10.1016/j.heliyon.2019.e02352>
7. Pinar Sen, Azole Sindelo, Donovan M. Mafukidze, Tebello Nyokong

Synthesis and photophysical properties of novel axially disubstituted silicon (IV) phthalocyanines and their photodynamic antimicrobial chemotherapy (PACT) activity against *Staphylococcus aureus*

**Synthetic Metals** **258** (2019) **116203** 1-9

DOI: 10.1016/j.synthmet.2019.116203

<https://doi.org/10.1016/j.synthmet.2019.116203>

8. Balaji Babu, Azole Sindelo, John Mack, Tebello Nyokong

Thien-2-yl substituted chlorins as photosensitizers for photodynamic therapy and photodynamic antimicrobial chemotherapy

**Dyes and Pigments**, **185** (2021) **10886** (1-8)

DOI: 10.1016/j.dyepig.2020.108886

<https://doi.org/10.1016/j.dyepig.2020.108886>

9. Lindokuhle Cindy Nene, Azole Sindelo, Jonathan Britton and Tebello Nyokong

Effect of ultrasonic frequency and power on the sonodynamic therapy activity of cationic Zn(II) phthalocyanines

**Journal of Inorganic Biochemistry** **217** (2021) **111397** (1-12)

DOI: 10.1016/j.jinorgbio.2021.111397

<https://doi.org/10.1016/j.jinorgbio.2021.111397>

10. Azole Sindelo, Donovan M Mafukidze and Tebello Nyokong

Fabrication of asymmetrical morpholine phthalocyanines conjugated chitosan-polyacrylonitrile nanofibers for improved photodynamic antimicrobial chemotherapy activity

**Photodiagnosis and Photodynamic Therapy** **38** (2022) **102760** (1-14)

DOI: 10.1016/j.pdpdt.2022.102760

<https://doi.org/10.1016/j.pdpdt.2022.102760>

11. Azole Sindelo, Jonathan Britton, Anabel E. Lanterna, Juan C. Scaiano and Tebello Nyokong

Decoration of glass wool with zinc (II) phthalocyanine for the photocatalytic transformation of methyl orange

**Journal of Photochemistry and Photobiology A: Chemistry** **432** (2022) **114127** (1-12)

DOI: 10.1016/j.jphotochem.2022.114127

<https://doi.org/10.1016/j.jphotochem.2022.114127>

12. Azole Sindelo, Lindokuhle Nene, Tebello Nyokong

Photodynamic antimicrobial chemotherapy with asymmetrical cationic or neutral metallophthalocyanines conjugated to amino-functionalized zinc oxide nanoparticles (spherical or pyramidal) against planktonic and biofilm microbial cultures

**Photodiagnosis and Photodynamic Therapy** **40** (2022) **103160** (1-13)

DOI: 10.1016/j.pdpdt.2022.103160

<https://doi.org/10.1016/j.pdpdt.2022.103160>

13. Azole Sindelo, Pinar Sen, Tebello Nyokong

Photodynamic inactivation of methicillin-resistant *Staphylococcus aureus* using pyrrolidinium containing Schiff base phthalocyanines

**Journal of Photochemistry & Photobiology, A: Chemistry** **438** (2023) **114535** (1-9)

DOI: 10.1016/j.jphotochem.2022.114535

<https://doi.org/10.1016/j.jphotochem.2022.114535>

14. Azole Sindelo, Pinar Sen, Tebello Nyokong  
Photoantimicrobial activity of Schiff-base morpholino phthalocyanines against drug resistant micro-organisms in their planktonic and biofilm forms

**Photodiagnosis and Photodynamic Therapy 42 (2023) 103519 (1-10)**

DOI: 10.1016/j.pdpdt.2023.103519

<https://doi.org/10.1016/j.pdpdt.2023.103519>

15. Pinar Sen, Azole Sindelo, Nnaemeka Nnaji, John Mack and Tebello Nyokong  
Diiodinated Mono- and Dipyridylvinyl BODIPY Dyes: Photophysical Properties, *in vitro* Antibacterial Studies, Molecular

**Photochemistry and Photobiology, 2023, 99: 947–956**

DOI: 10.1111/php.13698

<https://doi.org/10.1111/php.13698>

16. Azole Sindelo, Tebello Nyokong  
Photoinactivation of microorganisms and photodegradation of pollutants using phthalocyanines supported on nanofibers and glass wool

**Journal of Photochemistry & Photobiology, A: Chemistry 447 (2024) 115236 (1-12)**

DOI: 10.1016/j.jphotochem.2023.115236

<https://doi.org/10.1016/j.jphotochem.2023.115236>

#### **WORKSHOPS/CONFERENCES:**

**7<sup>th</sup> Annual DST/Mintek Nanotechnology Innovation Centre (NIC) Workshop - 25-26 Jan 2017  
Medical Research Council of South Africa (MRC), Cape Town, South Africa**

Oral Presentation:

Azole Sindelo and Tebello Nyokong

Development of magnetic nanoparticles-phthalocyanines conjugates for inactivation of bacteria

Oral Presentation

**Symposium on Chemico- and Biomedical Research**

**Zoology Major Lecture Theatre, Rhodes University - 23 June 2017**

Oral Presentation:

Azole Sindelo, Olawale Osifeko and Tebello Nyokong

Photo inactivation of bacteria and fungus using indium phthalocyanines conjugate to magnetic nanoparticles

**International Conference on Surfaces, Coatings and Nanostructured Materials (NANOSMAT-Africa Conference), Cape Town, 19-23 November 2018**

Oral Presentation:

Azole Sindelo and Tebello Nyokong

Development of Magnetic Nanoparticles-Phthalocyanine Conjugates for Inactivation of Bacteria

**11th International Conference on Porphyrins & Phthalocyanines (ICPP-11)**

**28th June to 3rd July 2021 (Virtual Meeting)**

Oral Presentation:

Azole Sindelo and Tebello Nyokong

Development of Magnetic Nanoparticles-Phthalocyanine Conjugates for Photoinactivation of Bacteria

**OVERSEAS TRAVEL:**

Shinshu University, Ueda, Japan  
1 Sept to 31 Oct 2017  
Research Collaboration (NRF SA/Japan) – Exchange student

Ms Azole Sindelo  
8 May – 6 August 2019  
University of Ottawa, Ottawa, Canada  
Reason: Exchange Student – NRF South Africa/Canada Research Collaboration

**AWARDS:**

Best ORAL presentation at the NANOSMAT International Conference held in Cape Town (Nov 2018)