



## RHODES UNIVERSITY, GRAHAMSTOWN, SOUTH AFRICA



**MR NNAMDI NWAHARA (POSTDOCTORAL FELLOW)**  
**SUPERVISOR: DISTINGUISHED PROFESSOR TEBELLO NYOKONG**

### **CONTACT DETAILS:**

Rhodes University  
Institute for Nanotechnology Innovation  
C/O Department of Chemistry  
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Makhanda (Grahamstown) 6140, South Africa  
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### **EDUCATION DETAILS:**

PhD (Chemistry) 2023 - Rhodes University, Grahamstown, South Africa  
MSc – with distinction (Chemistry) 2018 - Rhodes University, Grahamstown, South Africa  
BScH (Chemistry, with distinction) 2015 - Rhodes University, Grahamstown, South Africa  
BSc (Chemistry and Biology) 2014 - National University of Lesotho

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

Developments on conjugates of phthalocyanines with folic acid and graphene quantum dots for photodynamic therapy

## **PUBLICATIONS:**

1. Nwahara, Nnamdi; Britton, Jonathan; Nyokong, Tebello  
Improving singlet oxygen generating abilities of phthalocyanines: aluminum tetrasulfonated phthalocyanine in the presence of graphene quantum dots and folic acid  
**Journal of Coordination Chemistry (2017), 70(9), 1601-1616.**  
DOI:10.1080/00958972.2017.1313975  
<http://dx.doi.org/10.1080/00958972.2017.1313975>
2. Nwahara, Nnamdi; Achadu, Ojodomo J.; Nyokong, Tebello  
In-situ synthesis of gold nanoparticles on graphene quantum dots-phthalocyanine nanoplatfoms: First description of the photophysical and surface enhanced Raman scattering behaviour  
**Journal of Photochemistry and Photobiology, A: Chemistry (2018), 359, 131-144.**  
DOI:10.1016/j.jphotochem.2018.04.011  
<https://doi.org/10.1016/j.jphotochem.2018.04.011>
3. Nwahara, Nnamdi; Nkhahle, Reitemetse; Ngoy, Bokolombe P.; Mack, John; Nyokong, Tebello  
Synthesis and photophysical properties of BODIPY-decorated graphene quantum dot-phthalocyanine conjugates  
**New Journal of Chemistry (2018), 42(8), 6051-6061**  
DOI:10.1039/C8NJ00758F  
<http://pubs.rsc.org/en/content/articlehtml/2018/nj/c8nj00758f>
4. Ion, R-M., Nyokong, T., Nwahara, N., Suica-Bunghez, I-R., Iancu, L., Teodorescu, S., Dulama, I.D., Stirbescu, R.M., Gheboianu, A. and Grigorescu, R.M.  
Wood preservation with gold hydroxyapatite system  
**Heritage Science (2018), 6:37, 1-12**  
DOI: 10.1186/s40494-018-0202-5  
<https://doi.org/10.1186/s40494-018-0202-5>
5. Nwahara, Nnamdi; Managa, Muthumuni; Prinsloo, Earl; Nyokong, Tebello  
Design of Phthalocyanine-Nanoparticle Hybrids for Photodynamic Therapy Applications in Oxygen-Deficient Tumour Environment  
**ChemistrySelect (2019), 4(31), 9084-9095**  
DOI:10.1002/slct.201901466  
<https://doi.org/10.1002/slct.201901466>
6. Sivuyisiwe Mapukata, Nnamdi Nwahara, Tebello Nyokong  
The photodynamic antimicrobial chemotherapy of Staphylococcus aureus using an asymmetrical zinc phthalocyanine conjugated to silver and iron oxide based nanoparticles  
**Journal of Photochemistry and Photobiology A: Chemistry (2020) 402, 112813 (1-15)**  
DOI: 10.1016/j.jphotochem.2020.112813  
<https://doi.org/10.1016/j.jphotochem.2020.112813>
7. Sithi Mgidlana, Nnamdi Nwahara, Tebello Nyokong

Photocatalytic desulfurization of dibenzothiophene using methoxy substituted asymmetrical zinc(II) phthalocyanines conjugated to metal tungstate nanomaterials

**Polyhedron 197 (2021) 115053 (1-16)**

DOI: 10.1016/j.poly.2021.115053

<https://doi.org/10.1016/j.poly.2021.115053>

8. Nwahara, Nnamdi; Adeniyi, Omotayo; Mashazi, Philani; Nyokong, Tebello

Visible light responsive TiO<sub>2</sub> - graphene oxide nanosheets - Zn phthalocyanine ternary heterojunction assisted photoelectrocatalytic degradation of Orange G

**Journal of Photochemistry and Photobiology, A: Chemistry (2021), 414, 113291**

DOI:10.1016/j.jphotochem.2021.113291

<https://doi.org/10.1016/j.jphotochem.2021.113291>

9. Nwahara, Nnamdi; Managa, Muthumuni; Stoffels, Mihlali; Britton, Jonathan; Prinsloo, Earl; Nyokong, Tebello

Synthesis of a near infrared-actuated phthalocyanine-lipid vesicle system for augmented photodynamic therapy

**Synthetic Metals (2021), 278, 116811 (1-14)**

DOI:10.1016/j.synthmet.2021.116811

<https://doi.org/10.1016/j.synthmet.2021.116811>

10. Pinar Sen, Nnamdi Nwahara, Tebello Nyokong

Photodynamic antimicrobial activity of benzimidazole substituted phthalocyanine when conjugated to Nitrogen Doped Graphene Quantum Dots against *Staphylococcus aureus*

**Main Group Chemistry (2021) 20(2), 175-191**

DOI: 10.3233/MGC-210030

<https://content.iospress.com/articles/main-group-chemistry/mgc210030>

11. Nnamdi Nwahara, Garth Abrahams, Earl Prinsloo, Tebello Nyokong

Folic acid-modified phthalocyanine-nanozyme loaded liposomes for targeted photodynamic therapy

**Photodiagnosis and Photodynamic Therapy 102527 (1-11)**

DOI: 10.1016/j.pdpdt.2021.102527

<https://doi.org/10.1016/j.pdpdt.2021.102527>

12. Omotayo Adeniyi; Nnamdi Nwahara; Daniel Mwanza; Tebello Nyokong, Philani Mashazi

Nanohybrid electrocatalyst based on cobalt phthalocyanine-carbon nanotube-reduced graphene oxide for ultrasensitive detection of glucose in human saliva

**Sensors and Actuators B: Chemical (2021) 348, 130723 (1-13)**

DOI: 10.1016/j.snb.2021.130723

<https://doi.org/10.1016/j.snb.2021.130723>

13. Sivuyisiwe Mapukata, Jonathan Britton, Nnamdi Nwahara and Tebello Nyokong

The photocatalytic properties of zinc phthalocyanines supported on hematite nanofibers for use against methyl orange and *Staphylococcus aureus*

**Journal of Photochemistry and Photobiology A: Chemistry, 424 (2022) 113637 (1-12)**

DOI: 10.1016/j.jphotochem.2021.113637

<https://doi.org/10.1016/j.jphotochem.2021.113637>

14. Lekgowa Collen Makola, Nnamdi Nwahara, Muthumuni Managa, Tebello Nyokong  
Photodynamic therapy activity of 5,10,15-tris(5-bromo-2-thienyl),20(phenylcarboxy)porphyrin  
conjugated to graphene quantum dot against MCF-7 breast cancer cells

**Journal of Coordination Chemistry, 75:7-8 (2022), 1112-1128**

DOI: 10.1080/00958972.2022.2087515

<https://doi.org/10.1080/00958972.2022.2087515>

15. Nwahara, M. Motaung, G. Abrahams, P. Mashazi, J. Mack, E. Prinsloo, T. Nyokong  
Dual singlet oxygen and nitric oxide-releasing silicon phthalocyanine for augmented photodynamic  
therapy

**Materials Today Chemistry 26 (2022) 101201 (1-14)**

DOI: 10.1016/j.mtchem.2022.101201

<https://doi.org/10.1016/j.mtchem.2022.101201>

16. O. Adeniyi, N. Nwahara; D. Mwanza; T. Nyokong, P.N. Mashazi  
High-performance non-enzymatic glucose sensing on nanocomposite electrocatalysts of nickel  
phthalocyanine nanorods and nitrogen doped-reduced graphene oxide nanosheets

**Applied Surface Science 609 (2023) 155234 (1-13)**

DOI: 10.1016/j.apsusc.2022.155234

<https://doi.org/10.1016/j.apsusc.2022.155234>

17. Nnamdi Nwahara, Garth Abrahams, John Mack, Earl Prinsloo, Tebello Nyokong  
A hypoxia responsive silicon phthalocyanine containing naphthquinone axial ligands for  
photodynamic therapy activity

**Journal of Inorganic Biochemistry 239 (2023) 112078 (1-11)**

DOI: 10.1016/j.jinorgbio.2022.112078

<https://doi.org/10.1016/j.jinorgbio.2022.112078>

#### **CONFERENCE/WORKSHOPS:**

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

Oral Presentation:

Nnamdi Nwahara, Ojodomo Achadu and Prof Tebello Nyokong

In-situ Synthesis of Gold Nanoparticles on Graphene Quantum Dots-Phthalocyanine Nanoplatfoms:  
First Description of the Photophysical and Surface Enhanced Raman Scattering Behaviour

**11th International Conference on Porphyrins & Phthalocyanines (ICPP-11)  
28th June to 3rd July 2021 (Virtual Meeting)**

Oral Presentation:

Nnamdi Nwahara, Muthumuni Managa, Earl Prinsloo, Tebello Nyokong  
Oxygen Self-Sufficient Liposomal Systems for Photodynamic Therapy

**72nd Annual Meeting of the International Society of Electrochemistry  
29th August to 3th September 2021 (Virtual Meeting)**

Oral Presentation:

Nnamdi Nwahara, Omotayo Adeniyi, Philani Mashazi, Tebello Nyokong  
Ternary Heterojunction Assisted Photoelectrocatalytic Degradation of Orange G using Visible Light Responsive TiO<sub>2</sub> - Graphene Oxide Nanosheets - Zn Phthalocyanine

**12th International Conference on Porphyrins & Phthalocyanines (ICPP-12)**

Madrid, Spain 10-15 July 2022

Oral Presentation:

Nnamdi Nwahara, Garth Abrahams, Earl Prinsloo and Tebello Nyokong  
Prodrug-modified Phthalocyanine for Photodynamic Therapy

**AWARDS:**

2016 – Received award for highest marks in Chemistry Honours

2018 - Investec top 100 - General Excellence and Leadership Awards

**OVERSEAS TRAVEL:**

Institutul National de Cercetare-Dezvoltare pentru Chimie si Petrochimie ICECHIM  
Bucharest, Romania

Date: 3 Oct – 14 Nov 2016

Reason for visit: Research Collaboration (NRF SA/Romania): MSc Exchange Student

Ecole Nationale Supérieure de Chimie de Paris  
Paris, France

16 Oct to 21 Dec 2019

Reason: SA/France Research Collaboration (trip sponsored by French Embassy)