



RHODES UNIVERSITY, GRAHAMSTOWN, SOUTH AFRICA



STAFF INFORMATION

Professor G.M Watkins

Bsc(Hons); PhD (University of Cape Town); MSACI Associate Professor of Inorganic Chemistry & 3rd Year Course Coordinator

Find Me:

Postal Address: Department of Chemistry, Chemical and Pharmaceutical Sciences Building, Corner of University and Artillery Roads, Grahamstown, 6140

Courier Address: Department of Chemistry, Cnr of University and Artillery Roads, Rhodes University, Grahamstown, 6140, South Africa

Teaching:

1st Year: Chemical & physical equilibria

3rd Year: Coordination compounds & transition metal chemistry: Theoretical aspects, application in magnetism and spectroscopy.

Honours Year: Group theory; Advanced applied vibrational spectroscopy; Inorganic reaction mechanisms.

Previous:

2nd Year: Foundational Chemical Principles: Periodic trends of the main group elements

Research Interests:

“Thermal and spectroscopic studies of transition metal complexes & applied chemical technology”

As a physical inorganic chemist, my areas of interest are molecular spectroscopy, coordination chemistry and bioinorganic chemistry, applied to areas such as nanotechnology, medicinal and industrial uses. The group works with nmr, infrared and Raman spectroscopy, UV-visible spectroscopy, XRD(P), thermal analysis (TG, DSC and TG-FTIR) BET and molecular modelling. The group currently consists of six PhD, three MSc and two Honours students. Current Research Areas:

1. *Nanomaterials: Metal Organic Framework materials (MOF's);*
MOFs may be formed in the crystalline phase by the self- assembly of structurally defined molecular modules possessing translational symmetry of one or more dimensionality. Such open framed network nano-materials have a wide variety of structural diversity and are expected to exhibit novel properties such as inclusion behaviour. This behaviour has application in two areas of interest; in environmental applications and in separation science. In the area of environmental impact, there are two foci for MOFs relating to the adsorption of hydrogen, and of carbon monoxide. Currently MOFs are the only materials that meet the US Department of Energy targets for hydrogen storage devices, but at present at economically unfavourable pressure and temperature conditions. Certain MOFs have also been shown to have carbon dioxide adsorption characteristics double that of current commercial absorbers. Alternate MOFs are under investigation to identify candidates with better gas adsorption characteristics and selectivity for separation science.
2. *Bioinorganic metal complexes*
Metal Schiff base complexes have recently been shown to demonstrate antiplasmodial activity; the proposed activity of octahedral metal complexes containing N4O2 donors thought to occur by steric inhibition of haemozoin formation, thereby preventing the biomineralisation of the haeme which is toxic to the parasite. An alternative mechanism proposed for the antimalarial activity of four coordinate copper(II) complexes is the facile reduction to the cuprous species with subsequent activation of intracellular oxygen. Both mechanisms are targets of approach in this antimalarial study. This project involves the synthesis, characterization and in vitro and in vivo biological evaluation screening of different classes of Co(II), Co(III), Ni(II) and Cu(II) complexes with ligands containing ONO, ONS or NNS as donor atoms. Key biological techniques for the proposed study involve the use of antimicrobial bioassay, cell proliferation assays and antiplasmodial assays.
3. *Ligand isotope studies of transition metal complexes.*
Isotopic labelling of ligands is an important tool in identifying vibrational spectroscopic interactions within metal complexes; it is essential in vibrational analysis, and may provide relevant information in determining reaction mechanisms, amongst other things. These studies are allied with molecular modelling (DFT, CPMD, etc.)

Past Postgraduate Students:

PhD:

- Dr N.P. Magwa. “The development of amine-based extractants for separation of base metals in a sulfate medium.”(2015) (Co-supervisor)
- Dr. T.E. Olalekan. “*Synthesis, Characterisation and biological activity of 2-(methylthiomethyl) anilines, 2-(methylthio)anilines, their Schiff base derivatives and Metal(II) (Co, Ni, Cu) complexes*” (2013)
- Dr. A.O. Sobola. “*Synthesis, characterisation and antimicrobial activity of Cu(II) complexes of some hydroxybenzaldimines and their derivatives.*” (2012)
- Dr. R.O. Shaibu. “*A bioinorganic study of some cobalt(II) complexes of variously substituted hydroxybenzaldimines.*” (2008)

- Dr. E. Lamprecht. *"Thermal, spectroscopic and X-ray diffraction studies of copper(II) 1, 2, 4, 5- benzenetetracarboxylates and copper(II) oxalate: A study of metal-organic frameworks."* (2008)
- Dr. J.J. Guthrie Strachan. *"The investigation, development and characterisation of novel zirconium-based tanning agents."* (2006)
- Dr. A. Dairam. *"An investigation into the neuroprotective properties of the non-steroidal anti-inflammatory agent tolmetin, sulindac and tumeric."* (2006)(Co-supervisor).
- Dr. G.J.M. Medina. *"Ligand isotope vibrational spectroscopic and DFT studies of Pt(II) & Cu(I) complexes."* (2005)
- Dr. A.P.M. Antunes. *"Removal and recovery of Gold and Platinum from aqueous solutions utilizing the non-viable biomass Azolla filiculoides."* (2002)(Joint supervisor).

MSc:

- Mr W. Moloto. *"A bulk and fraction-specific geochemical study of the origin of diverse high-grade hematitic iron ores from the Transvaal Supergroup, Northern Cape Province, South Africa."* (2017) (Co-supervisor)
- Mr W. Feldmann. *"Study into the Synthesis, Characterisation and Applications of Vanadium-based Metal Organic Frameworks, using 1, 2, 4, 5-Benzenetetracarboxylic acid."* (2016)
- Mr. M.J. Coombes *"A Comparative Study of Two Copper(II) Based Metal-Organic Frameworks: $\text{Cu}_2\frac{1}{4}(\text{OH})\frac{1}{2}\text{B}_4\text{C}\cdot 8\text{H}_2\text{O}$ and $\text{Cu}_2\text{Na}(\text{OH})\text{B}_4\text{C}\cdot 7\text{H}_2\text{O}$ "* (2013)(Distinction)
- Mr. C.A. Makanjee *"An experimental and theoretical investigation of unstable Fischer chromium carbene complexes."* (2013) (Co-supervisor)
- Ms. N.P. Magwa *"A spectroscopic study of the electronic effects on copper(II) and copper(I) complexes of ligands derived from variously substituted benzaldehyde- and cinnamaldehyde-based Schiff bases."* (2010)
- Ms. E. Mopp *"An bioinorganic investigation of some metal complexes of the Schiff base N,N'-bis(3-methoxysalicylaldimine)propan-2-ol."* (2010)

2018 Publications:

1. **Achadu, O.J. and Nyokong, T.** (2018) Fluorescence "turn-ON" nanosensor for cyanide ion using supramolecular hybrid of graphene quantum dots and cobalt pyrene-derivatized phthalocyanine. *Dyes and Pigments*. 2018. p.1-8.
2. **Ayeni, A.O., Watkins, G.M. and Hosten, E.C.** (2018) Polymorphism of a new Mannich base-[4-methyl-2-((4-(4-nitrophenyl) piperazin-1-yl) methyl) phenol]. *Journal of Molecular Structure*. 1160 (2018). p.38-45.
3. **Ayeni, A.O. and Watkins, G.M.** (2018) Synthesis and evaluation of catecholase activities of metal complexes of 1, 4-substituted piperazine Mannich Base of 4-acetamidophenol. *Turkish Journal of Chemistry*. 42 (2018). p.1275-1284.
4. **Ayeni, A.O. and Watkins, G.M.** (2018) Biomimetics of mononuclear and dinuclear Cu(II) and Fe(III) complexes of a newly synthesized piperazyl Mannich base with or without thiocyanate towards catechol. *Monatshefte Fur Chemie*. 149 (2018). p.2175-2182.
5. **Ayeni, A.O., Watkins, G.M. and Hosten, E.C.** (2018) Molecular and Crystal structure of a novel Mannich quaternary salt: 3-(dimethylamino)-1-*p*-tolylpropan-1-one hydrochloride. *Journal of Structural Chemistry*. 59 (7). p.1688-1690.
6. **Beteck, R.M., Isaacs, M., Hoppe, H.C. and Khanye, S.D.** (2018) Synthesis, *in vitro* Cytotoxicity and Trypanosomal Evaluation of Novel 1,3,6-Substituted Non-fluoroquinolones. *South African Journal of Chemistry – Suid-Afrikaanse Tydskrif Vir Chemie*. 71 (2018). p.188-195.
7. **Centane, S., Sekhosana, K.E., Matshitse, R. and Nyokong, T.** (2018) Electrocatalytic activity of a push-pull phthalocyanine in the presence of reduced and amino functionalized graphene quantum dots towards the electrooxidation of hydrazine. *Journal of Electroanalytical Chemistry*. 820 (2018). p.146-160.

8. **Chani, F.M., Ngcoza, K.M., Chikunda, C. and Sewry, J.D.** (2018) Exploring the Mediation of Learning of Chemical Equilibrium to High-achieving Students in a Selected Senior Secondary School in Namibia. *African Journal of Research in Mathematics, Science and Technology Education*. 22 (3). p.287-296.
9. **Chindeka, F., Mashazi, P., Britton, J., Fomo, G., Oluwole, D.O., Sindelo, A. and Nyokong, T.** (2018) Optimizing phthalocyanine based dye-sensitized solar cells: The role of reduced graphene oxide. *Synthetic Metals*. 246 (2018). p.236-245.
10. **Darrell, O.T., Hulushe, S.T., Mtshare, T.E., Beteck, R.M., Isaacs, M., Laming, D., Hoppe, H.C., Krause, R.W.M. and Khanye, S.D.** (2018) Synthesis, Antiplasmodial and Antitrypanosomal Evaluation of a Series of Novel 2-Oxoquinoline-based Thiosemicarbazone Derivatives. *South African Journal of Chemistry – Suid-Afrikaanse Tydskrif Vir Chemie*. 71 (2018). p.174-181.
11. **Milanowski, D.J., Oku, N., Cartner, L.K., Bokesch, H.R., Williamson, R.T., Sauri, J., Liu, Y., Blinov, K.A., Ding, Y., Li, X.C., Ferreira, D., Walker, L.A., Khan, S., Davies-Coleman, M.T., Kelley, J.A., McMahon, J.B., Martin, G.E., and Gustafson, K.R.** (2018) Unequivocal determination of caulamidines A and B: application and validation of new tools in the structure elucidation tool box. *Chemical Science*. 9 (2018). p.307-314.
12. **Dube, E. and Nyokong, T.** (2018) Effect of gold nanoparticles shape and size on the photophysicochemical behaviour of symmetric and asymmetric zinc phthalocyanines. *Journal of Luminescence*. 2018. p.1-8.
13. **Dube, E., Nwaji, N., Mack, J. and Nyokong, T.** (2018) The photophysicochemical behavior of symmetric and asymmetric zinc phthalocyanines, surface assembled onto gold nanotriangles. *New Journal of Chemistry*. 42 (2018). p.14290-14299.
14. **Dube, E., Oluwole, D.O. and Nyokong, T.** (2018) Improved Photophysical and Photochemical Properties of Thiopheneethoxy Substituted Metallophthalocyanines on Immobilization onto Gold-speckled Silica Nanoparticles. *Photochemistry and Photobiology*. 94 (2018). p.521-531.
15. **Dube, E., Oluwole, D.O., Prinsloo, E. and Nyokong, T.** (2018) A gold-chitosan composite with low symmetry zinc phthalocyanine for enhanced singlet oxygen generation and improved photodynamic therapy activity. *New Journal of Chemistry*. 42 (2018). p.10214-10225.
16. **Dube, E., Oluwole, D.O., Nwaji, N. and Nyokong, T.** (2018) Glycosylated zinc phthalocyanine-gold nanoparticle conjugates for photodynamic therapy: Effect of nanoparticle shape. *Spectrochimica Acta Part A – Molecular and Biomolecular Spectroscopy*. 203 (2018). p.85-95.
17. **Faridoon, H., Mnkandhla, D., Isaacs, M., Hoppe, H.C. and Kaye, P.T.** (2018) Synthesis and evaluation of substituted 4-arylimino-3-hydroxybutanoic acids as potential HIV-1 integrase inhibitors. *BIOORGANIC & Medicinal Chemistry Letters*. 28 (2018). p.1067-1070.
18. **Fomo, G., Achadu, O.J. and Nyokong, T.** (2018) One-pot synthesis of graphene quantum dots phthalocyanines supramolecular hybrid and the investigation of their photophysical properties. *Journal of Materials Science*. 53 (2018). p.538-548.
19. **Fomo, G., Nwaji, N. and Nyokong, T.** (2018) Low symmetric metallophthalocyanine modified electrode via click chemistry for simultaneous detection of heavy metals. *Journal of Electroanalytical Chemistry*. 813 (2018). p.58-66.
20. **Gumbo, M., Beteck, R.M., Mandizvo, T., Seldon, R., Warner, D.T., Hoppe, H.C., Isaacs, M., Laming, D., Tam, C.C., Cheng, L.W., Liu, N., Land, K.M. and Khanye, S.D.** (2018) Cinnamoyl-Oxaborole Amides: Synthesis and Their in Vitro Biological Activity. *Molecules*. 23 (2018). p.1-13.

21. **Idowu, M.A., Xego, S., Arslanoglu, Y., Mack, J., Antunes, E. and Nyokong, T.** (2018) Photophysicochemical behaviour and antimicrobial properties of monocarboxy Mg (II) and Al (III) phthalocyanine-magnetite conjugates. *Spectrochimica Acta Part A – Molecular and Biomolecular Spectroscopy*. 193 (2018). p.407-414.
22. **Isalomboto Nkanga, C. and Krause, R.W.M.** (2018) Abstract: Formulation and characterization of pH-/light-responsive liposomes for macrophage targeted delivery of isoniazid. *Chemical Papers*. 10 (2018). p.24-25.
23. **Isalomboto Nkanga, C. and Krause, R.W.M.** (2018) Conjugation of isoniazid to a zinc phthalocyanine via hydrazone linkage for pH-dependent liposomal controlled release. *Applied Nanoscience*. 8 (2018). p.1313-1323.
24. **Isalomboto Nkanga, C., Walker, R.B. and Krause, R.W.M.** (2018) pH-Dependant release of isoniazid from isonicotinic acid (4-hydroxy-benzylidene)-hydrazide loaded liposomes. *Journal of Drug Delivery Science and Technology*. 45 (2018). p.264-271.
25. **Olawode, E.O., Tandlich, R., Prinsloo, E., Isaacs, M., Hoppe, H.C., Sheldon, R., Warner, D.T., Steenkamp, V. and Kaye, P.T.** (2018) Synthesis and biological screening of diethyl [N-(thiazol-2-yl)carbamoyl]methylphosphonates. *Arkivoc*. 7 (2018). p.110-118..
26. **Kumar, A., Khan, F.I. and Olaniran, A.O.** (2018) Chloroacetaldehyde dehydrogenase from *Ancylobacter aquaticus* UV5: Cloning, expression, characterization and molecular modeling. *International Journal of Biological Macromolecules*. 114 (2018). p.1117-1126.
27. **Ali, S., Khan, F.I., Chen, W., Rahaman, A. and Wang, Y.** (2018) Open and closed states of Mrp1 DAG lipase revealed by molecular dynamics simulation. *Molecular Simulation*. 44 (18). p.1520-1528.
28. **Gulzar, M., Syed, S.B., Khan, F.I., Khan, P., Ali, S., Hasan, G.M., Taneja, P. and Hassan, M.I.** (2018) Elucidation of interaction mechanism of ellagic acid to the integrin linked kinase. *International Journal of Biological Macromolecules*. 2018. p.1-8.
29. **Beg, A., Khan, F.I., Lobb, K.A., Islam, A., Ahmad, F. and Hassan, M.I.** (2018) High throughput screening, docking, and molecular dynamics studies to identify potential inhibitors of human calcium/calmodulin-dependent protein kinase IV. *Journal of Biomolecular Structure & Dynamic*. 2018. p.1-14.
30. **Husain, F.M., Ahmad, I., Khan, F.I., Al-Shabib, N.A., Baig, M.H., Hussain, A., Rehman, M.T., Alajmi, M.F. and Lobb, K.A.** (2018) Seed Extract of *Psoralea corylifolia* and Its Constituent Bakuchiol Impairs AHL-Based Quorum Sensing and Biofilm Formation in Food- and Human-Related Pathogens. *Frontiers in Cellular and Infection Microbiology*. 8 (351). p.1-16.
31. **Syed, S.B., Khan, F.I., Khan, S.H., Srivastava, S., Hasan, G.M., Lobb, K.A., Islam, A., Hassan, M.I. and Ahmad, F.** (2018) Unravelling the unfolding mechanism of human integrin linked kinase by GdmCl-induced denaturation. *International Journal of Biological Macromolecules*. 117 (2018). p.1252-1263.
32. **Mohammad, T., Khan, F.I., Lobb, K.A., Islam, A., Ahmad, F. and Hassan, M.I.** (2018) Identification and evaluation of bioactive natural products as potential inhibitors of human microtubule affinity-regulating kinase 4 (MARK4). *Journal of Biomolecular Structure & Dynamics*. 2018. p.1-17.
33. **Syed, S.B., Khan, F.I., Khan, S.H., Srivastava, S., Hasan, G.M., Lobb, K.A., Islam, A., Hassan, M.I. and Ahmad, F.** (2018) Unravelling the unfolding mechanism of human integrin linked kinase by GdmCl-induced denaturation. *International Journal of Biological Macromolecules*. 117 (2018). p.1252-1263.
34. **Khan, S., Khan, F.I., Mohammad, T., Khan, P., Hasan, G.M., Lobb, K.A., Islam, A., Ahmad, F. and Hassan, M.I.** (2018) Exploring molecular insights into the interaction mechanism of cholesterol derivatives with the Mce4A: A combined spectroscopic and molecular dynamic simulation studies. *International Journal of Biological Macromolecules*. 111 (2018). p.548-560.

35. Odame, F., Betz, R., Hosten, E.C., Krause, J., **Isaacs, M., Hoppe, H.C., Khanye, S.D.,** Sayed, Y., Frost, C.L., **Lobb, K.A.** and Tshentu, Z.R. (2018) A New Synthetic Method for Tetraazatricyclic Derivatives and Evaluation of Their Biological Properties. *ChemistrySelect*. 3 (2018). p.13613-13618.
36. Gounden, D., **Khene, S.** and Nombona, N. (2018) Electroanalytical detection of heavy metals using metallophthalocyanine and silica-coated iron oxide composites. *Chemical Papers*. 72 (2018). p.3043-3056.
37. Namondo, B.V., Foba-Tendo, J., Etape, E.P. and **Krause, R.W.M.** (2018) Potential of blended biomass feedstock from some species of raffia palm (*Raffia farinifera*, *Raffia hookeri* and *Raffia vinifera*) and Oil Palm Empty Fruit Bunch (OPEFB) from Cameroon. *African Journal of Pure and Applied Chemistry*. 12 (4). p.25-33.
38. **Kubheka, G., Sanusi, K., Mack, J. and Nyokong, T.** (2018) Optical limiting properties of 3,5-dipyrenylvinylene BODIPY dyes at 532 nm. *Spectrochimica Acta Part A – Molecular and Biomolecular Spectroscopy*. 191 (2018). p.357-364.
39. **Lebechi, A.K.,** Gai, L., Shen, Z., **Nyokong, T. and Mack, J.** (2018) Electrospun 3,5-dithienylvinyleneBODIPY embedded polystyrene nanofibers for the photocatalytic degradation of azo dyes in industrial wastewaters. *Journal of Porphyrins and Phthalocyanines*. 22 (2018). p.501-508.
40. **Musyoka, T.M., Tastan Bishop, O., Lobb, K.A. and Moses, V.** (2018) The determination of CHARMM force field parameters for the Mg²⁺ containing HIV-1 integrase. *Chemical Physics Letters*. 711 (2018). p.1-7.
41. Odame, F., Krause, J., Hosten, E.C., Betz, R., **Lobb, K.A.,** Tshentu, Z.R. and Frost, C.L. (2018) Synthesis, Characterization and DPPH Scavenging Activity of some Benzimidazole Derivatives. *Bulletin of the Chemical Society of Ethiopia*. 32 (2). p.271-284.
42. Odame, F., Hosten, E.C., Betz, R., **Lobb, K.A.** and Tshentu, Z.R. (2018) Characterization and Computational Studies of a Co-Crystal of 2-Aminobenzimidazole and 2-[(Benzolycarbamothioyl) Amino]Propanoic Acid. *Journal of Structural Chemistry*. 59 (5). p.1200-1204.
43. Liang, X., Li, M., **Mack, J., Lobb, K.A.** and Zhu, W. (2018) Iron(III)porphyrin electrocatalyzed enantioselective carbon-chloride bond cleavage of hexachlorocyclohexanes (HCHs): combined experimental investigation and theoretical calculations. *Dalton Transactions*. 47 (2018). p.11470-11476.
44. Bomanda, B.T., Waudu, W., Ngoy, B.P., Muya, J.T., Mpiana, P.T., Mbala, M., Openda, I., **Mack, J. and Nyokong, T.** (2018) Photophysical and *in vitro* Antibacterial Studies of 2,6-Dibromo-BODIPY Dye Substituted with Dithienylenevinylene at 3,5-Positions. *Macroheterocycles*. 11 (4). p.429-437.
45. Abdurrahmanoglu, S., Canlica, M., **Mack, J. and Nyokong, T.** (2018) Pyridone substituted phthalocyanines: Photophysico-chemical properties and TD-DFT calculations. *Journal of Porphyrins and Phthalocyanines*. 22 (2018). p.25-31.
46. Liang, X., Luo, H., Lan, Y., Zhu, W., **Mack, J., Hlatshwayo, Z., Nyokong, T.** and Chen, Q. (2018) n - Extended BODIPY Analogues: Synthesis, Electronic Structure, Potential Utility for *in vivo* Imaging Applications and Cytotoxicity. *Macroheterocycles*. 11 (4). p.421-428.
47. Liang, X., Qin, M., Zhou, L., Liu, T., Li, M., **Mack, J., Ndebele, N., Nyokong, T.** and Zhu, W. (2018) Porphyrin dimers with a bridging chiral amide-bonded benzo-moiety: Influence of positional isomerism on the molecular chirality. *Dyes and Pigments*. 154 (2018). p.229-233.
48. Yuan, X., Li, M., Meng, T., **Mack, J., Soy, R., Nyokong, T.,** Zhu, W., Xu, H. and Liang, X. (2018) Core-modified rubyrins with phenanthrene-fused pyrrole rings: Highly selective and tunable response to Hg²⁺ ions. *Dyes and Pigments*. 158 (2018). p.188-194.

49. **Mafukidze, D.M. and Nyokong, T.** (2018) A comparative study of the singlet oxygen generation capability of a zinc phthalocyanine linked to graphene quantum dots through π - π stacking and covalent conjugation when embedded in asymmetric polymer members. *Journal of Molecular Structure*. 1180 (2018). p.307-317.
50. **Magadla, A., Oluwole, D.O., Britton, J. and Nyokong, T. Magadla, A., Oluwole, D.O., Britton, J. and Nyokong, T.** (2018) Effect of nature of nanoparticles on the photophysicochemical properties of asymmetrically substituted Zn phthalocyanines. *Inorganica Chimica Acta*. 482 (2018). p.438-446.
51. **Makinde, Z.O., Louzada, M.S., Britton, J., Nyokong, T. and Khene, S.** (2018) Spectroscopic and nonlinear optical properties of alkyl thio substituted binuclear phthalocyanines. *Dye and Pigments*. 2018. p.1-8.
52. **Managa, M., Achadu, O.J. and Nyokong, T.** (2018) Photophysical studies of graphene quantum dots - Pyrene-derivatized porphyrins conjugates when encapsulated within Pluronic F127 micelles. *Dyes and Pigments*. 148 (2018). p.405-416.
53. **Managa, M., Britton, J., Prinsloo, E. and Nyokong, T.** (2018) Effects of Pluronic F127 micelles as delivering agents on the *vitro* dark toxicity and photodynamic therapy activity of carboxy and pyrene substituted porphyrins. *Polyhedron*. 152 (2018). p.102-107.
54. **Managa, M., Khene, S., Britton, J., Martynov, A.G., Gorbunova, Y.G., Tsivadze, A.Y. and Nyokong, T.** (2018) Photophysics and NLO properties of Ga(III) and In(III) phthalocyaninates bearing diethyleneglycol chains. *Journal of Porphyrins and Phthalocyanines*. 22 (2018). p.137-148.
55. **Managa, M., Ngoy, B.P., Mafukidze, D.M. and Nyokong, T.** (2018) Incorporation of metal free and Ga 5,10,15,20-tetrakis(4-bromophenyl) porphyrin into Pluronic F127-folic acid micelles. *Journal of Luminescence*. 194 (2018). p.739-746.
56. **Matlou, G.G., Kobayashi, N., Kimura, M. and Nyokong, T.** (2018) Physicochemical properties of water-soluble unsymmetrical phthalocyanine-folic acid conjugates. *Dyes and Pigments*. 149 (2018). p.393-398.
57. **Matlou, G.G., Oluwole, D.O., Prinsloo, E. and Nyokong, T.** (2018) Photodynamic therapy activity of zinc phthalocyanine linked to folic acid and magnetic nanoparticles. *Journal of Photochemistry and Photobiology B – Biology*. 186 (2018). p.216-224.
58. **Matlou, G.G., Oluwole, D.O. and Nyokong, T.** (2018) Evaluation of the photosensitizing properties of zinc and indium tetra cinnamic acid phthalocyanines linked to magnetic nanoparticles on human breast adenocarcinoma cells. *Journal of Luminescence*. 2018. p.1-8.
60. **Matshitse, R. and Nyokong, T.** (2018) Singlet Oxygen Generating Properties of Different Sizes of Charged Graphene Quantum Dot Nanoconjugates with a Positively Charged Phthalocyanine. *Journal of Fluorescence*. 28 (2018). p.827-838.
61. **Matshitse, R., Nwaji, N., Managa, M., Prinsloo, E. and Nyokong, T.** (2018) Effect of number of positive charges on the photophysical and photodynamic therapy activities of quaternary benzothiazole substituted zinc phthalocyanine. *Journal of Photochemistry and Photobiology A – Chemistry* 367 (2018). p.253-260.
62. **Mbaba, M., De La Mare, J.A., Sterrenberg, J.N., Kajewole, D.I., Maharaj, S., Edkins, A.L., Isaacs, M., Hoppe, H.C. and Khanye, S.D.** (2018) Novobiocin-ferrocene conjugates possessing anticancer and antiplasmodial activity independent of HSP90 inhibition. *Journal of Biological Inorganic Chemistry*. 2018. p.1-11.
63. **Mgidlana, S., Oluwole, D.O. and Nyokong, T.** (2018) Effects of the carboxylic acid substituents on the photophysical and nonlinear optical properties of asymmetrical Zn(II) phthalocyanines-quantum dots conjugates. *Inorganic and Nano-Metal Chemistry*.

64. **Mgidlana, S., Oluwole, D.O. and Nyokong, T.** (2018) Fabrication of efficient nonlinear optical absorber using Zn phthalocyanine-semiconductor quantum dots conjugates. *Polyhedron*. 2018. p.1-14.
65. **Molupe, N., Babu, B., Oluwole, D.O., Prinsloo, E., Mack, J. and Nyokong, T.** (2018) The investigation of *in vitro* dark cytotoxicity and photodynamic therapy effect of a 2,6-dibromo-3,5- distyryl BODIPY dye encapsulated in Pluronic® F-127 micelles. *Journal of Coordination Chemistry*. 71 (21). p.3444-3457.
66. **Ejeromedoghene, O., Adewuyi, S., Amolegbe, S.A., Akinremi, C.A., Moronkola, B.A. and Salaudeen, T.** (2018) Electrovalent chitosan functionalized methyl-orange/metal nanocomposites as chemosensors for toxic aqueous anions. *Nano-Structures and Nano-Objects*. 16 (2018). p.174-179.
67. **Mpeta, L.S., Fomo, G. and Nyokong, T.** (2018) Click chemistry electrode modification using 4-ethynylbenzyl substituted cobalt phthalocyanine for applications in electrocatalysis. *Journal of Coordination Chemistry*. 71 (10). p.1623-1638.
68. **Mvango, S. and Mashazi, P.** (2018) Synthesis, characterization of coppier oxide-gold nanoalloys and their peroxidase-like activity towards colorimetric detection of hydrogen peroxide and glucose. *Materials Science & Engineering C-Materials for Biological Applications*. 2018. p.1-10.
69. **Mwanza, D., Louzada, M.S., Britton, J., Sekhosana, K.E., Khene, S., Nyokong, T. and Mashazi, P.** (2018) The effect of the cobalt and manganese central metal ions on the nonlinear optical properties of tetra(4-propargyloxyphenoxy)phthalocyanines. *New Journal of Chemistry*. 42 (2018). p.9857.
70. **Ndebele, N., Mack, J. and Nyokong, T.** (2018) A 3,5-DistyrylBODIPY Dye Functionalized with Boronic Acid Groups for Direct Electrochemical Glucose Sensing. *Electroanalysis*. 2018. p.1-9.
71. **Ngoy, B.P., Hlatshwayo, Z., Nwaji, N., Fomo, G., Mack, J. and Nyokong, T.** (2018) Photophysical and optical limiting properties at 532 nm of BODIPY dyes with *p*-benzyloxystyryl groups at the 3,5-positions. *Journal of Porphyrins and Phthalocynines*. 22 (2018). p.413-422.
72. **Ngoy, B.P., May, A.K., Mack, J. and Nyokong, T.** (2018) Effect of bromination on the optical limiting properties at 532 nm of BODIPY dyes with *p*-benzyloxystyryl groups at the 3,5-positions. *Journal of Molecular Structure*. 2018. p.1-9.
73. **Nwahara, N., Achadu, O.J. and Nyokong, T.** (2018) 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*. 359 (2018). p.131-144.
74. **Nwahara, N., Nkhahle, R., Ngoy, B.P., Mack, J. and Nyokong, T.** (2018) Synthesis and photophysical properties of BODIPY-decorated graphene quantum dot-phthalocyanine conjugates. *New Journal of Chemistry*. 42 (2018). p.6051-6061.
75. **Nwaji, N., Achadu, O.J. and Nyokong, T.** (2018) Photo-induced resonance energy transfer and nonlinear optical response in ball-type phthalocyanine conjugated to semiconductor and graphene quantum dots. *New Journal of Chemistry*. 42 (2018). p.6040-6050.
76. **Nwaji, N., Dingiswayo, S., Mack, J. and Nyokong, T.** (2018) Photophysical and enhanced nonlinear optical response in asymmetric benzothiazole substituted phthalocyanine covalently linked to semiconductor quantum dots. *Spectrochimica Acta Part A – Molecular and Biomolecular Spectroscopy*. 204 (2018). p.629-639.

77. **Nwaji, N., Mack, J. and Nyokong, T.** (2018) An optical limiting study in aminophenoxy substituted phthalocyanine in the presence of semiconductor quantum dots. *Journal of Luminescence*. 203 (2018). p.247-256.
78. **Nwaji, N., Mack, J. and Nyokong, T.** (2018) Photophysical and strong optical limiting properties of ball-type phthalocyanines dimers and their monomeric analogues. *Journal of Photochemistry and Photobiology A – Chemistry*. 352 (2018). p.73-85.
79. **Nwaji, N., Mack, J. and Nyokong, T.** (2018) Enhanced nonlinear optical response of benzothiazole substituted ball-type phthalocyanines in the presence of metallic nanoparticles. *Optical Materials*. 82 (2018). p.93-103.
80. **Ion, R.M., Nyokong, T., Nwahara, N., Suica-Bunghes, I.-R., Iancu, L., Teodorescu, S., Dulama, I.D., Stirbescu, R.M., Gheboianu, A. and Grigorescu, R.M.** (2018) Wood preservation with gold hydroxyapatite system. *Heritage Science*. 6 (37). p.1-12.
81. **Oderinlo, O., Tukulula, M., Isaacs, M., Hoppe, H.C., Taylor, D., Smith, V.J. and Khanye, S.D.** (2018) New thiazolidine-2,4-dione derivatives combined with organometallic ferrocene: Synthesis, structure and antiparasitic activity. *Applied Organometallic Chemistry*. 32 (2018). p.1-12.
82. **Oluwole, D.O., Achadu, O.J., Asfour, F., Chakona, G., Mason, P., Mataruse, P. and McKenna, S.** (2018) Postgraduate Writing Groups as Spaces of Agency Development. *South African Journal of Higher Education*. 32 (6). p.370-381.
83. **Oluwole, D.O., Manoto, S.L., Malabi, R., Maphanga, C., Ombinda-Lemboumba, S., Mthunzi-Kufa, P. and Nyokong, T.** (2018) Evaluation of the photophysicochemical properties and photodynamic therapy activity of nanoconjugates of zinc phthalocyanine linked to glutathione capped Au and Au₃Ag₁ nanoparticles. *Dyes and Pigments*. 150 (2018). p.139-150.
84. **Oluwole, D.O. and Nyokong, T.** (2018) Optical nonlinearity of pentadecylphenoxy substituted sandwich-type metallophthalocyanines in the presence of Ag-CdSeTe/ZnTeSe nanocrystals: Effects of conjugation and central metals. *Dyes and Pigments*. 151 (2018). p.254-262.
85. **Oluwole, D.O., Sari, F.A., Prinsloo, E., Dube, E., Yuzer, A., Nyokong, T. and Ince, M.** (2018) Photophysicochemical properties and photodynamic therapy activity of highly water-soluble Zn(II) phthalocyanines. *Spectrochimica Acta Part A – Molecular and Biomolecular Spectroscopy*. 203 (2018). p.236-243.
86. **Oluwole, D.O., Nwaji, N., Nene, L.C., Mokone, L., Dube, E. and Nyokong, T.** (2018) Novel nano-dyad of homoleptic sandwich-type phthalocyanines with nitrogen doped graphene quantum dots for nonlinear optics. *New Journal of Chemistry*. 42 (2018). p.10124-10133.
87. **Peteni, S. and Nyokong, T.** (2018) Effect of doping vs covalent linking of a low symmetry zinc phthalocyanine to silica nanoparticles on singlet oxygen production. *Inorganica Chimica Acta*. 482 (2018). p.431-437.
88. **Sekhosana, K.E., Nkhahle, R. and Nyokong, T.** (2018) The Primary Demonstration of Exciton Coupling Effects on Optical Limiting Properties of Blue Double-Decker Lanthanide Phthalocyanine Salts. *ChemistrySelect*. 3 (2018). p.6671-6682.
89. **Sewry, J.D. and Paphitis, S.** (2018) Meeting important educational goals for chemistry through service-learning. *Chemistry Education Research and Practice*. 19 (2018). p.973-982.
90. **Sindelo, A., Osifeko, O.L. and Nyokong, T.** (2018) Synthesis, photophysicochemical and photodynamic antimicrobial chemotherapy studies of indium pyridyl phthalocyanines: Charge versus bridging atom. *Inorganica Chimica Acta*. 476 (2018). p.68-76.

91. Fonkui, T.Y., Ikhile, M.I., Muganza, F.M., Fotsing, M.C.D., Arderne, C., **Siwe Noundou, X., Krause, R.W.M.**, Ndinteh, D.T. and Njobeh, P.B. (2018) Synthesis, characterization and biological applications of novel Schiff bases of 2-(trifluoromethoxy) aniline. *Journal of Chinese Pharmaceutical Sciences*. 27 (5). p.307-323.
92. Teinkela, J.E.M., **Siwe Noundou, X.**, Nguemfo, E.L., Meyer, F., Wintjens, R., **Isaacs, M.**, Mpondo Mpondo, E.M., **Hoppe, H.C., Krause, R.W.M.** and Azebaze, A.G.B. (2018) Biological activities of plant extracts from *Ficus elastica* and *Selaginella vogelli*: An antimalarial, antitrypanosomal and cytotoxicity evaluation. *Saudi Journal of Biological Sciences*. 25 (2018). p.117-122.
93. Mbeunkeu, A.B.D., Azebaze, A.G.B., Tala, M.F., Teinkela, J.E.M., **Siwe Noundou, X., Krause, R.W.M.**, Vardamides, J.C. and Laatsch, H. (2018) Three new pentacyclic triterpenoids from twigs of *Manniophyton Fulvum* (Euphorbiaceae). *Phytochemistry Letters*. 27 (2018). p.1-8.
94. Senthilkumar, S., Goswami, R., **Smith, V.J.**, Bajaj, H.C. and Neogi, S. (2018) Pore Wall-Functionalized Luminescent Cd(II) Framework for Selective CO₂ Adsorption, Highly Specific 2,4,6-Trinitrophenol Detection, and Colorimetric Sensing of Cu²⁺ Ions. *ACS Sustainable Chemistry & Engineering*. 6 (2018). p.10295-10306
95. **Sobola, A.O., Watkins, G.M.** and Van Brecht, B. (2018) Synthesis, characterization and biological study of Cu(II) complexes of aminopyridine and aminomethylpyridine Schiff bases. *Journal of the Serbian Chemical Society*. 83 (7-8). p.242-245.
96. **Stone, J., Mack, J., Nyokong, T.**, Kimura, M. and Kobayashi, N. (2018) Photophysical properties of a novel styryl-BODIPY with a fused crown ether moiety. *Journal of Porphyrins and Phthalocyanine*. 22 (2018). p.1-9.

2017 Publications:

1. "Synthesis And Characterization Of Variously Substituted Hydroxybenzaldimines Derived From The Condensation Of Aniline or 1-Aminonaphthalene With Salicylaldehyde And Its Derivatives." Shaibu, O.R. and **Watkins, M.G.** *Ife Journal of Science* vol. 18, no. 3 (2016) 613-622
2. "Synthesis and characterization of a cobalt-2,6-pyridinedicarboxylate MOF with potential application in electrochemical sensing." Tafadzwa W. Murinzi, Eric Hosten, **Gareth M. Watkins**, *Polyhedron* Volume 137, 24 November 2017, Pages 188–196.
3. "Kinetic studies of the impact of thiocyanate moiety on the catalytic properties of Cu(II) and Fe(III) complexes of a new Mannich base." Ayeni O. Ayowole, **Gareth M. Watkins**. *Journal of Molecular Structure* Available online 5 December 2017 In Press, Accepted Manuscript <https://doi.org/10.1016/j.molstruc.2017.12.011>

Older:

- "Spectroscopic, structural and theoretical studies of copper(II) complexes of tridentate NOS Schiff bases" Temitope E. Olalekan, Adeniyi S. Ogunlaja, Bernardus Van Brecht, Gareth M. Watkins *Journal of Molecular Structure*. (2016) 1122, Pages 72–79. <http://dx.doi.org/10.1016/j.molstruc.2016.05.098>
- "Dimethylammonium 2,4,5-tricarboxybenzoate. An example of the decarbonylation of N,N-dimethylformamide in the presence of a metal and a benzenepolycarboxylic acid. Is zirconium(IV) the Tsotsi?" S. T. Hulushe, E. C. Hosten and G. M. Watkins *Acta Cryst. E Research Communications* (2016). E72. 1521-1525.
- "Sorption of trioctyl amine to kaolinite." F Moyo, R Tandlich, P Madikizela, E Chifunda and GM Watkins *Fresenius Environmental Bulletin*, (2016) 25 (1), 78-88.
- "Synthesis, Structure and Theoretical Studies of bis(pentacoordinated) μ -o-[CuL₂]₂: Predicting Distortion towards Trigonality." A.O. Sobola, G.M Watkins, B. Van Brecht and I.A. Adejoro. *J. Coord. Chem.* (2016) 69(1), 81-89
DOI: 10.1080/00958972.2015.1110853.

- "Synthesis And Spectroscopic Studies Of Schiff Bases From Variously Substituted Benzaldehydes And 2-Aminomethyl Pyridine." Rafiu O Shaibu and Gareth M Watkins. *Ife Journal of Science* (2015) 17(1)31-39.
- "Crystal structures, spectroscopic and theoretical studies of novel Schiff bases of 2-(methylthiomethyl) anilines" by Temitope Elizabeth Olalekan, Isaiah Adejoro, Bernardus Van Brecht and Gareth Mostyn Watkins. *Spectrochim Acta A*, (2015) 139, 385-395.
- "Copper(II) complexes of 2-(methylthiomethyl)anilines: Spectral, structural properties and in vitro antimicrobial activity," by Temitope Elizabeth Olalekan, Denzil Ronald Beukes, Bernardus Van Brecht and Gareth Mostyn Watkins *Journal of Inorganic Chemistry*, (2014), 2014, Article ID 769573, 10 pages <http://dx.doi.org/10.1155/2014/769573>
- "Synthesis, Characterisation and antimicrobial activity of Copper(II) complexes of some o-substituted aniline Schiff bases; Crystal structure of bis(2-methoxy-6-imino)methylphenol copper(II) complex" AO Sobola, GM Watkins and B van Brecht. *South African Journal of Chemistry* (2014) 67, 45-51 (ISSN 03794350)
- "Antimicrobial activity and Cu(II) complexes of Schiff bases derived from ortho-aminophenol and salicylaldehyde derivatives" Abdullahi Owolabi Sobola and Gareth Mostyn Watkins *Journal of Chemical and Pharmaceutical Research*, 2013, 5(10):147-154 (ISSN : 0975-7384 CODEN(USA) : JCPRC5)
- "The coordination and extractive chemistry of the later 3d transition metals with bis((1R-benzimidazol-2-yl)methyl)sulphide" N. Magwa, E. Horsten, G.M Watkins and Z. R. Tshentu *Journal of Coordination Chemistry* Vol. 66, No. 1, 10 January 2013, 114–125(DOI: 10.1080/00958972.2012.748192)
- "An Exploratory Study of Tridentate Amine Extractants: Solvent Extraction and Coordination Chemistry of Base Metals with Bis((1R-benzimidazol-2-yl)methyl)amine" N. Magwa, E. Horsten, G.M Watkins and Z. R. Tshentu *International Journal of Nonferrous Metallurgy*, 1 (2012) 49-58.
- "Introducing Chemistry Students to the "Real World" of Chemistry" Michael E. Brown, Ronald C. Cosser, Michael T. Davies-Coleman, Perry T. Kaye, Rosalyn Klein, Emmanuel Lamprecht, Kevin Lobb, Tebello Nyokong, Joyce D. Sewry, Zenixole R. Tshentu, Tino van der Zeyde, and Gareth M. Watkins. *J. Chemical Education*, 87 (2010) 500-3.
- "Designer ligands. Part 15. Synthesis and characterisation of Novel Mn(II), Ni(II) and Zn(II) complexes of 1, 10 phenanthroline-derived ligands" K.W. Wellington, P.T. Kaye and G.M. Watkins, *ARKIVOC*, xiv (2009) 301-313.
- "Designer ligands. Part 14. Novel Mn(II), Ni(II) and Zn(II) complexes of benzamide- and biphenyl-derived ligands" K.W. Wellington, P.T. Kaye and G.M. Watkins, *ARKIVOC*, xvii (2008) 248-264.
- "Curcuminoids, curcumin and demethoxycurcumin, reduce lead (Pb) induced memory deficits in male Wistar rats." A. Dairam, J.L. Limson G.M. Watkins, E. Antunes and S. Daya, *J. Agri. Food Chem.* 55 (2007) 1039-44.
- "Thermal decomposition of copper(II) oxalate revisited." E. Lamprecht, G.M. Watkins and M.E. Brown. *Thermochim. Acta*, 446 (2006) 91-100.
- "Designer Ligands. Part 13. Synthesis and catalytic activity of transition metal complexes of a multidentate macrocyclic ligand." Perry T. Kaye, Gareth M. Watkins and Kevin W. Wellington, *S. Af. J. Chem.*, 58 (2005), 1-3.
- "100 years of chemistry at Rhodes University." Brown, M.E. and Eve, D.J. and Kaye, Perry T. , Rivett, D.E.A. and Watkins, G.M. *South African Journal of Science*, 100 (2004) 530-538
- "Designer Ligands. Part 9. Catalytic activity of biomimetic copper(II) and cobalt(II) complexes of multidentate ligands. " Perry T. Kaye, Tebello Nyokong, Gareth M. Watkins and Kevin W. Wellington, *ARKIVOC*, 9 (2002) 9 - 18.
- "Through metal binding curcumin protects against lead- and cadmium-induced lipid peroxidation in rat brain homogenates and against lead-induced tissue damage in rat brain." S.Daniel, J.L. Limson, A. Dairam, G.M. Watkins and S. Daya, *J. Inorg. Biochem.* 98 (2004) 266-275.

- The removal of Gold from aqueous solution by the viable microbial biomass *Phoma* sp." A.P.M. Antunes J.R. Duncan , G. M. Watkins and A. Maclear., *Res. & Environ. Biotech.* 3 (2002) 219-228.
- "Batch studies on the removal of Gold(III) from aqueous solution by *Azolla filiculoides*." A.P.M. Antunes, G. M. Watkins and J.R. Duncan, *Biotech. Letters*, 23 (2001) 249-251.
- . "Thermal and structural studies of amide complexes of transition metal(II) chlorides. I: Stoichiometry." A.N. Nelwamondo, D.J. Eve, G.M. Watkins and M.E. Brown, *Thermochimica Acta*, 318 (1998) 165-175.
- "The infrared spectra of the square planar rhodium(I) complexes *cis*-[Rh(CO)₂(pyridine)(X)](X = Cl, Br). Isotopic labelling studies and normal co-ordinate analysis." P.S. Hall, G.E. Jackson, J.R. Moss, D.A. Thornton, P.F.M. Verhoeven and G.M. Watkins, *Spectrosc. Letters*, 26 (1993) 1247-1267.
- "Vibrational conformational-analysis of methyl fluoroacetate and methyl difluoroacetate." B.J. Van der Veken, S. Truyens, W.A. Herrebou and G. Watkins, *J. Mol. Struct.*, 293 (1993) 55-58.
- "The infrared spectra (4000 - 50 cm⁻¹) of quinoline *N*-oxide and its perdeuterated analogue with metal(II) perchlorates of the first transition series." D.A. Thornton and G.M. Watkins, *J. Coord. Chem.*, 29 (1993) 45-56.
- "The limitations to employing the vibrational assignment notation of an aromatic homocycle to its heterocyclic analogues." D.A. Thornton and G.M. Watkins, *Spectrosc. Letters*, 26 (1993) 887-895.
- "The infrared, nmr (¹H, ¹³C) and electronic spectra of the complexes *cis*-[Rh(CO)₂(pyridine *N*-oxide)(X)](X = Cl, Br)." P.S. Hall, G.E. Jackson, J.R. Moss, D.A. Thornton and G.M. Watkins, *J. Alloys and Compounds*, 197 (1993) 67-74.
- "Ligand isotope studies of Zeise's salt derivatives (and their CO analogues) with some aza-heterocycles and their *N*-oxides. II. Their preparation, characterization and use in developing ¹H nmr and infrared spectra as a diagnostic tool." P.S. Hall, G.A. Foulds, D.A. Thornton and G.M. Watkins, *Spectrochim. Acta*, 48A (1992) 597-604.
- "An assessment of the assignment of characteristic N-O vibrations in aromatic *N*-oxides." D.A. Thornton and G.M. Watkins, *Spectrosc. Letters*, 25 (1992) 1023-1036.
- "Ligand isotope studies of Zeise's salt derivatives (and their CO analogues) with some aza-heterocycles and their *N*-oxides. I. Full infrared spectral assignments (4000 - 50 cm⁻¹)." G.A. Foulds, D.A. Thornton and G.M. Watkins, *Spectrochim. Acta*, 48A (1992) 577-596.
- "The infrared spectra (4000 - 50 cm⁻¹) of 2,2'-bipyridine *N,N'*-dioxide and its perdeuterated analogue with metal(II) perchlorates of the first transition series." D.A. Thornton and G.M. Watkins, *J. Coord. Chem.*, 25 (1992) 317-326.
- "The infrared spectra (4000 - 50 cm⁻¹) of 2,2'-bipyridine, 1,10-phenanthroline and their perdeuterated analogues with metal(II) perchlorates of the first transition series." D.A. Thornton and G.M. Watkins, *J. Coord. Chem.*, 25 (1992) 299-315.
- "A full vibrational assignment (4000 - 50 cm⁻¹) of 1,10-phenanthroline and its perdeuterated analogue." D.A. Thornton and G.M. Watkins, *Spectrochim. Acta*, 47A (1991) 1085-1096.
- "Isotopic labelling studies of some aromatic *N*-oxides IV. A full vibrational assignment of the infrared spectra (4000 -50 cm⁻¹) of quinoline *N*-oxide dihydrate and its fully deuterated analogue." D.A. Thornton and G.M. Watkins, *Bull. Chim. Soc. Belg.*, 100 (1991) 235-245.
- "Isotopic labelling studies of some aromatic *N*-oxides III. A full vibrational assignment of the infrared spectra (4000 - 50 cm⁻¹) of 2,2'-bipyridine *N,N'*-dioxide and its fully deuterated analogue." D.A. Thornton and G.M. Watkins, *Bull. Chim. Soc. Belg.*, 100 (1991) 221-234.
- "Isotopic labelling studies of some aromatic *N*-oxides II. A full vibrational assignment of the infrared and Raman spectra (4000 - 50 cm⁻¹) of pyrazine *N*-oxide and its fully deuterated analogue." D.A. Thornton, P.F. Verhoeven, G.M. Watkins, H.O. Desseyn and B.J. van der Veken. *Bull. Chim. Soc. Bela.* 100 (1991) 211-220..

- "The infrared spectra of ethylenediamine complexes II. *Tris*-, *bis*- and *mono*- (ethylenediamine) complexes of metal(II) halides." A.M.A. Bennett, G.A. Foulds, D.A. Thornton and G.M. Watkins, *Spectrochim. Acta*, 46A (1990) 13-22.
- "Isotopic labelling studies of some aromatic *N*-oxides I. A full vibrational assignment of the infrared and Raman spectra (4000 - 50 cm⁻¹) of pyrazine *N,N'*-dioxide and its fully deuterated analogue." D.A. Thornton, P.F. Verhoeven, G.M. Watkins, H.O. Desseyn and B.J. van der Veken, *Spectrochim. Acta*, 46A (1990) 1439-1451.
- "A re-examination of the infrared spectra of first transition series metal(II) and metal(III) tropolonates." K.J. Burden, D.A. Thornton and G.M. Watkins, *Spectrochim. Acta*, 45A (1989) 1179-1186.
- A double isotopic labelling study of the infrared spectra of the linkage isomers [Pd(bipy)(SCN)₂], [Pd(bipy)(NCS)₂] and related complexes." C. Engelter, D.A. Thornton and G.M. Watkins, *Spectrosc. Letters*, 22 (1989) 935-944.
- Cisplatin. Synthesis of some 2,3-diaminopropionic ester analogues: dichloro(hexadecyl 2,3- diaminopropionato) platinum(II) and dichloro(cyclohexyl 2,3- diaminopropionato) platinum(II)." D.B. Firfiray, R.G.F. Giles, D.A. Thornton, G.M. Watkins, G.C. Yorke, A. Becker and R.R. Levitt, *S. Afr. J. Chem.*, 40 (1987) 149-150.
- "The infrared spectra of complexes of variously substituted anilines with platinum(II) halides." T.P.E. Auf der Heyde, G.A. Foulds, D.A. Thornton and G.M. Watkins, *Spectrosc. Letters*, 14 (1981) 455-462.
- "The infrared spectra of aniline complexes of platinum(II) halides and nitrite." T.P.E. Auf der Heyde, G.A. Foulds, D.A. Thornton and G.M. Watkins, *J. Molec. Struct.*, 77 (1981) 19-24.
- "The infrared spectra (600 - 150 cm⁻¹) of pyridine *N*-oxide complexes of metal(II) halides and mixed-ligand (pyridine *N*-oxide / dimethylsulphoxide) complexes of copper(II) halides." T.P.E. Auf der Heyde, C.S. Green, D.E. Needham, D.A. Thornton and G.M. Watkins, *J. Molec. Struct.*, 70 (1981) 121-126.