NELSON MANDELA UNIVERSITY

Newsletter 2019

Department of Chemistry News

Foreword from the HOD (Dr. B. Hlangothi)

The year 2018 was yet another successful year for the Nelson Mandela University Chemistry Department. This is evidenced by successful activities in all our core functions; learning & teaching, research and community involvement.

We saw a total of 17 BSc Honours Chemistry, 19 (9 full-time and 10 part-time) BSc Honours Formulation Science and 5 Advanced Diploma in Chemistry students registering in January 2018 and the majority of these students successfully completing their qualifications in 1 year. In our undergraduate Diploma programmes, the new students' intake was 39 for the Diploma in Analytical Chemistry, 30 for the Diploma in Polymer Technology and 29 for the Diploma in Chemical Process Technology. While we started with 31 BSc 3rd-year students, the BSc first year class had 250 students including service modules. It is clear that the Departments' strategy to vigorously market Chemistry in schools has seen an increase in new intake this year, much thanks to colleagues and students driving this for us.

The Department has a wide range of equipment that is available for both teaching and research. These include 400 MHz NMR, GC-MS, GC-FID, EPR, AAS, SC-XRD and PXRD, HPLC, ATR-FTIR, TG-MS and DSC, UV-Vis and Fluorescence Spectrometers, TAMIII Calorimeter and a newly acquired Tensile Tester which is due to be commissioned mid August 2019. We constantly have industry at our doorstep looking for students who have qualified with relevant and advanced skills, thus the Department must keep-up with acquiring modernized equipment to train our students both in under and postgraduate levels. We are also proud to be associated with InnoVenton, Centre for Rubber Science and Technology (CRST)..uYilo, CSIR (PE) and a DST-NRF Research Chair in Microfluidic Bio-chemical Processing which is headed by Prof Paul Watts. Research undertaken within the entities as well as the Department is of the highest international standard, and our MSc and PhD projects are aligned with the institutional and national priorities. The department had about 33 research journal outputs in 2018 and 5 books/ chapters as well as many structure communications.

The Departments' success could have not been achieved if it was not of the commitment and competence of our staff, both academic and technical, whose efforts were often beyond the call of duty. I therefore wish to thank all staff in the department for their unfailing commitment to the academic agenda.

Open Day 2018

Diploma students and Department interns showing experiments to

The Open day took place on Friday, 11 May 2018 and over 200 matriculants from different high schools attended the annual event that takes place at the Nelson Mandela University. The event is aimed at sharing an educational platform on the many career choices available within the Nelson Mandela University and its various faculties.

The Chemistry Dept participated again this year by show casing various experiments that students find magical and entertaining such as the methylene blue experiment in which a clear solution changes colour to blue upon shaking, the creation of fake blood, etc. Attendees who wanted to engage and interact with the lecturers and interns present at the chemistry stall did so freely at the venue. Brochures for the various courses offered in the Department were also handed out to scholars; both interns and lecturers present answered questions from the attendees.

The Flame Test

Pearson High School Grade 11 Career Evening

Former HOD Professor Tshentu and the interns

Pearson High School held its annual Career Evening on the 16th of August 2018. The event attracted educational exhibitors from Nelson Mandela University, Rhodes University alongside participants from commercial industries from in and around the Nelson Mandela Bay Municipality.

The Nelson Mandela University, Department of Chemistry took part in this event. The event comprised of three sessions at twenty-minute intervals in which Grade 11 learners together with their parents, could visit various venues displaying different courses offered at the university. The Department of Chemistry's presentations were well attended, averaging ten to fifteen Grade 11 learners per session. The presentations were led by Prof Zenixole Tshentu (former HOD), followed by Dr Shawn Gouws (Programme coordinator for Diploma in Chemical Process Technology) and Ms Anita Noah (Analytical Chemistry lecturer). Each presentation session was followed by an informal discussion session on the various career opportunities for graduates and general application of chemistry in our daily lives. Prof Zenixole Tshentu welcomed all parents and learners and gave an overview of the wide range of courses offered in the Department from diplomas to degrees. He then focused on the Bachelor of Science degree in Chemistry (major), the foundational modules presented at first year level and further studies into BSc Honours (Chemistry), BSc Honours Formulation Science, Masters and Doctorate. Dr Shawn Gouws presentation emphasized the need for process control technicians in the chemical industry, to operate and maintain chemical process plants. The Diploma in Chemical Process Technology affords the students with such training. Ms Anita Noah's presentation focussed on the importance of analysts in the various manufacturing sectors of the chemical industry ranging from pharmaceutical, food, agricultural, medicinal etc., and the important role they play in ensuring the quality of our consumer products. The Nelson Mandela University, Department of Chemistry would like to thank Pearson High for extending the invitation.

We wish all the learners the best of luck for the upcoming exams and for the future!

Awards

Chemistry Excellence Awards

The Department of Chemistry held its annual academic awards ceremony to recognize the efforts of our accomplished graduates. The event took place on Thursday, the 19th of April 2018, at the Alumni Relations Center on North Campus. Staff from the Department of Chemistry, students nominated for the Excellence Awards and their guests were amongst those in attendance. The Master of Ceremony, Nehemiah Latolla, a second year PhD Chemistry student at Nelson Mandela University, offered awe-inspiring opening remarks to the Chemistry Excellence Awards in recognition of the class of 2017. The Director of the School of Biomolecular and Chemical Science, Prof Gill Dealtry, gave heart-warming, witty and welcoming remarks. She emphasized the importance of these awards, the recognition of excellence as well as the teamwork displayed by her colleagues in the Department of Chemistry and InnoVenton. The Head of Department, Prof Zenixole Tshentu, congratulated the awardees for their commitment to excellence. On excellence, Prof. Tshentu remarked that according to Vince Lombardi, “Perfection is not attainable, but if we chase perfection, we can catch excellence”. Rather than striving to get everything just right, strive to excel in your way. Aristotle said, “Excellence is a habit” Prof Tshentu said, “in addition, excellence is made continuous by the need to continue a process such that the experience is achieved all over again”. In his final comments, he encouraged the awardees to shine everywhere they go.

From left: Nosibusiso Jokani, Nicole Naidoo, Prof Zenixole Tshentu,Tendai Dembaremba and Siyabonga Shoba

The awards were presented to the Top Students who obtained the highest marks, with distinctions. The Merit Certificates were awarded to:

- Best student for Diploma in Analytical Chemistry - Miss Nicole Naidoo
- Best student for Diploma in Chemical Process Technology - Miss Nosibusiso Jokani
- Best student for BSc Honours in Chemistry - Mr Jordan Slabbert
- Best student for BSc Honours in Formulation Science - Mr Siyabonga Shoba
- Best student for MSc in Chemistry - Mr Tendai Dembaremba

SACI Awards

The SACI EC Postgraduate seminars took place in Umtata. Our students represented us well. Congratulations to the following students:
Junior Category - Ms Sinazo Nqeketo (3rd place)
Senior Category – Mr Keith Nare (joint 1st place).
First for SACI EC.

FameLabSA

Mrs Pulleng Moleko-Boyce (PhD student) won the first round of the FamelabSA competition that was held on the 12 of April 2018 and represented Nelson Mandela University at the national semi-finals where she was one of the top 8 national finalists on the 9th of May 2018. She unfortunately did not make the top spot but did very well up to the final round of presentations. FamelabSA is an international competition and the SA competition was looking for one winner to represent South Africa at the Cheltenham Science Festival in the UK (United Kingdom). In this competition, young scientists present and explain a scientific concept to a general audience in three minutes. Pulleng presented on a concept that focuses on “recycling of precious metals from secondary sources” due to the importance of these metals and their high yields from processing products that can be mined from the cities compared with processing low grade mineral ores.

Other Awards

1. Prof Barton Benita received the Golden Key Faculty of Science Lecturer of the Year 2018.
2. Prof Paul Watts Awarded “Innovation Excellence Award 2018.
3. Prof Paul Watts Awarded R3, 349, 000 by the NRF National Equipment Programme to purchase flow chemistry equipment.
4. Prof Paul Watts Awarded R 2, 688, 149 in collaboration with Prof Darelle van Greunen for an EU project coordinated by Technical University of Eidenhoven. The project will investigate local manufacture of agrochemicals.
5. Prof Paul Watts awarded R520 000 by NRF for a joint project in collaboration with Prof Neil Koorbanally at UKZN

Investec Regional Business Achievers Awards

The 2018 annual BWA Investec Regional Business Achievers Awards (RBAA) was hosted at The Boardwalk Hotel and Convention Centre on the 21st of June to recognise business women who have achieved excellence and noteworthy milestones in their careers, companies and organisations. Dr Buyiswa Hlangothi, who is now the HOD of the Chemistry Department was nominated by a member of the community in the government category to which she became one of the Top 18 finalists. What stood out for her was her commitment and passion for teaching as well as being involved in mentoring young girls. The Chemistry Department is proud of Dr Hlangothi and would like to congratulate her.

Graduation

The Department of Chemistry had 139 students awarded diplomas and degrees in two graduation ceremonies that took place in April and December of 2018. Congratulations to all our graduates.

- BSc with Chemistry major (24 students),
- Diploma in Analytical Chemistry (39 students),
- Advanced Diploma in Analytical Chemistry (5 students),
- Diploma in Polymer Technology (9 students),
- Diploma in Chemical Process Technology (27 students),
- Bachelor of Technology in Chemistry (2 students),
- BSc Honours in Formulation Science (4 students),
- Master degrees (2 MTech, 3 MSc Nanoscience and 8 MSc in Chemistry) and
- PhDs in Chemistry (7 students).

Master of Science in Chemistry (Research)

AGBAKOBA, Victor Chike - Cum Laude
Title of dissertation:
POTENTIAL USE OF CARBON NANOTUBES AS A NANOFILLER FOR NATURAL RUBBER LATEX CONDOMS

BATTISON, Aidan Leigh
Title of dissertation:
SYNTHESIS AND APPLICATION OF NOVEL COUMARIN-TRIAZOLE-BASED POLYMERIC SENSORS TOWARDS METAL ION SENSING

DEMBAREMBA, Tendai Olsen - Cum Laude
Title of dissertation:
VANADIUM-BASED CATALYSTS FOR OXIDATION OF ORGANOSULFUR COMPOUNDS: SYNTHESIS, CATALYSIS AND MECHANISTIC STUDIES

DU PLESSIS, Jacolien - Cum Laude
Title of dissertation:
THE SYNTHESIS OF FUNCTIONALIZED CARBON NANOMATERIAL FROM WASTE TYRE SOURCED CARBON FOR CHEMOSENSING DURING PURIFICATION PROCESSES

ROEGBU, Austine Ofondu
Title of dissertation:
EFFECTS OF POLYMERISATION CONDITIONS ON THE MECHANISM AND PROPERTIES OF FUFURYL ALCOHOL RESIN

MANGWIRO, Ruvimbo - Cum Laude
Title of dissertation:
NEW SYNTHETIC APPROACH TO SYNTHESIS OF TB DRUGS: ISONIAZID

STRYDOM, Martin - Cum Laude
Title of dissertation:
MANUFACTURING OF CONTINUOUS FLOW EQUIPMENT

TSIPA, Phuti Cedrick
Title of dissertation:
METHOD DEVELOPMENT FOR CHEMOLYSIS OF WASTE TYRES AND CHARACTERIZATION OF THE COMPONENTS

Master of Technology: Chemistry

MNGOMA, Mondeli
Title of dissertation:
PHYTOCHEMICAL ANALYSIS AND BIOLOGICAL ACTIVITY STUDIES OF AN EASTERN CAPE MEDICINAL PLANT, STRYCHNOS HENNINGSII

SONTI, Thembela Celia
Title of dissertation:
EXTRACTION OF DIALLYL SULPHIDES AND OTHER SIMILAR COMPOUNDS FROM TULBAGHIA VIOLACEA, A SOUTH AFRICAN PLANT, FOR POTENTIAL USE AS DEVULCANIZING AGENT

Masters of Science in Nanoscience (Coursework)

JOSEPH, Sinelizwi Veronica
Title of treatise: THE DEVELOPMENT OF RHENIUM (III) OXIDE NANORADIOPHARMACEUTICALS

XOLO, Luthando
Title of treatise: SYNTHESIS OF FOLATE-CONJUGATED PALLADIUM NANOPARTICLES

MADIKANE, Zipporah Kayakazi
Title of treatise:
ELECTROSPINNING OF CARBON NANOFIBERS FOR INVESTIGATING THE BEHAVIOUR OF LEAD ELECTRODEPOSITS ON THE CARBON SURFACE

Doctor of Philosophy: Chemistry

BURGER, Kirstin
Title of thesis:
SYNTHESIS AND CHARACTERISATION OF NOVEL ACETALS DERIVED FROM EUCALYPTUS OIL

DORFLING, Sasha-Lee
Title of thesis:
ASSESMENT OF THE HOST POTENTIAL OF TETROL [(+)-(2R,3R)-1,1,4,4-TETRAPHENYLBUTANE -1,2,3,4-TETRAOL] FOR THE SEPARATION OF ISOMERS AND RELATED COMPOUNDS

POHL, Pieter Lourens
Title of thesis:
INVESTIGATION OF THE POTENTIAL SEPARATION OF ISOMERS AND RELATED COMPOUNDS USING HOST COMPOUND (2R,3R-(−)-2,3-DIMETHOXY-1,1,4,4-TETRAPHENYLBUTANE-1,4-DIOL

POSTMA-BOTHA, Martha Leona
Title of thesis:
THE EXTRACTION, QUANTIFICATION AND APPLICATION OF HIGH-VALUE BIOLOGICAL COMPOUNDS FROM OLIVE OIL PROCESSING WASTE

MUHAMMAD SABIU ABDUL-QUADIR
Thesis: MOLECULARLY IMPRINTED POLYMERIC MATERIALS FOR ADSORPTIVE REMOVAL OF NITROGEN COMPOUNDS FROM FUEL OILS

HOPE BALOYI
Thesis: INVESTIGATION OF THE THERMO-CHEMICAL BEHAVIOUR OF COAL-ALGAE AGGLOMERATES

VITUS OBIALO EJESIEME
Thesis: AN INVESTIGATION OF THE COMBUSTION KINETICS OF COAL -MICROALGAE COMPOSITE

Research Outputs

1. A comparison of the behaviour of two closely related xanthenyl-derived host compounds in the presence of vaporous dihaloalkanes. Lize de Jager, Benita Barton, Eric C. Hosten. Journal of Inclusion Phenomena and Macrocyclic Chemistry, 2018, 92, 181-194. DOI: 10.1007/s10847-018-0833-x

2. Characterization and computational studies of a co-crystal of 2-aminobenzimidazole and 2-[(benzoylcarbamothioyl)amino]propanoic acid. Odame F., Hosten E.C., Betz R., Lobb K., Tshentu Z.R. J. Struc. Chem., 2018, 59 (5), 1240-1244. DOI: 10.26902/ JSC20180526

3. Complexes of Ambidentate N,O-Donor Ligands with Rhenium(I) and -(V). Annemè Boyce, Thomas I. A. Gerber, Eric C. Hosten. J. Chem. Crystallography, 2018, 48. 96-102. DOI: 10.1007/s1087 0-018-0715-5

4. Complexes of TETROL with selected heterocyclics: unconventional host–guest hydrogen bonding and the correlation with host selectivity. Benita Barton, Sasha Lee Dorfling, Eric C. Hosten. Journal of Inclusion Phenomena and Macrocyclic Chemistry, in press. DOI: 10.1007/s10847-018-0840-y

5. DMT [(−)-(2R,3R)-2,3-dimethoxy-1,1,4,4-tetraphenylbutane-1,4-diol], a highly efficient host compound for nitroaromatic guests: selectivity, X-ray and thermal analyses. Benita Barton, Eric C. Hosten, Pieter L. Pohl. Journal of Inclusion Phenomena and Macrocyclic Chemistry, 2018, in press. DOI: 0.1007/s10847-018-0853-6

6. Effects of the Type of Catalyst on the Polymerisation Mechanism of Furfuryl Alcohol and its Resultant Properties. Austine O. Iroegbu, Shanganyane P. Hlangothi. Chemistry Africa, 2018. DOI: 10.1007/ s42250-018-0017-5

7. Host (-)-(2R,3R)-2,3-Dimethoxy-1,1,4,4-tetraphenylbutane-1,4-diol and Guests Aniline, N-Methylaniline, and N,N-Dimethylaniline: A Selectivity Study. Benita Barton, Eric C. Hosten, and Pieter L. Pohl. Aust. J. Chem., 2018, 71, 133-141. DOI: 10.1071/CH17532

8. Host behaviour of related compounds, TETROL and DMT, in the presence of two different classes of aromatic guest compounds. Benita Barton, Lize de Jager, Sasha-Lee Dorfling, Eric C. Hosten, Cedric W. McCleland, Pieter L. Pohl. Tetrahedron, 2018, 74, 4754-4760. DOI: 10.1016/ j.tet.2018.07.044

9. Host compounds (+)-(2R,3R)-1,1,4,4-tetraphenylbutane-1,2,3,4-tetraol (TETROL) and (2R,3R)-(-)-2,3-dimethoxy-1,1,4,4-tetraphenylbutane-1,4-diol (DMT) with guests o-, m- and p- toluidine: A comparative investigation. Benita Barton, Sasha-Lee Dorfling, Eric C. Hosten, Pieter L. Pohl. Tetrahedron, 2018, 74, 2754-2761. DOI: 10.1016/j.tet.2018.04.039

10. Host proficiency of N,N′-bis(9-phenyl-9-thioxanthenyl)ethylenediamine for pyridine and the methylpyridine guests – a competition study. Benita Barton, Lize de Jager & Eric C. Hosten. Supramolecular Chemistry, 2018, 30(1), 61-71. DOI 10.1080/10610278.2017.1361037

11. Hydrogen Bonding, the Driving Force for Increased Host Selectivities in Two-Solvent Mixed Complexes of TETROL Comprising Both Favored (Aniline) and Disfavored Guests (o Toluidine or Toluene). Benita Barton, Sasha-Lee Dorfling, and Eric C. Hosten. Cryst. Growth Des., 2018, 18(6), 3569-3575. DOI: 10.1021/acs.cgd.8b00364

12. Metal-mediated reactions towards the synthesis of a novel deaminolysed bisurea,

Research Outputs (Cont.)

dicarbamolyamine. Felix Odame, Eric Hosten, Zenixole R. Tshentu. Open Chem., 2018, 16, 535-543. DOI: 10.1515/chem-2018-0058

13. Molecular and crystal structure of a novel Mannich quatenary salt: 3-(Dimethylamino)-1-p-tolylpropan-1-one hydrochloride. Ayowole A.O., Watkins G.M., Hosten E.C. Journal of Structural Chemistry, 2018, in press. DOI: 10.26902/JSC20180724

14. Organomercury complexes bearing (thioxothiazolidin-5-yl)methyl moiety by intramolecular heteromercuration reaction of diallyldithiocarbamate. Madalina Hrubaru, Damian C.Onwudiwe, Sergiu Shova, Constantin Draghici, Laszlo Tarko and Eric C. Hosten. Inorg. Chim. Acta, 2018, 471, 257-264. DOI: 10.1016/j.ica.2017.11.010

15. Organotin(IV) complexes derived from N-ethyl-N-phenyldithiocarbamate: Synthesis, characterization and thermal studies. Jerry O. Adeyemi, Damian C. Onwudiwe, Eric C. Hosten. J. Saudi. Chem. Soc., 2018, 22(4), 427-438. DOI: 10.1016/j.jscs.2017.08.004

16. Polymorphism of a new Mannich base - [-4-methyl-2-((4-(4-nitrophenyl)piperazin-1-yl)methyl)phenol]. Ayowole O. Ayeni, Gareth M. Watkins, Eric C. Hosten. J. Mol. Struct., 2018, 1160, 38-45. DOI: 10.1016/j.molstruc.2018.01.068

17. Synthesis and Characterization of complex (BenzMeIm)2[PtCl4]. Mohamad Ali Hikmat, Mahmoud Jamal Azheen, Gerber Thomas, Hosten Eric. Chinese J. Inorg. Chem., 2018, 34 (4), 728-732. DOI: 10.11862/CJIC.2018.096

18. Synthesis and characterization of homoleptic group 10 dithiocarbamate complexes and heteroleptic Ni(II) complexes, and the use of the homoleptic Ni(II) for the preparation of nickel sulphide nanoparticles. Felicia F. Bobinihi, Damian C. Onwudiwe, Eric C. Hosten. J. Mol. Struct., 2018, 1164, 475-485. DOI: 10.1016/j.molstruc.2018.03.063

19. Synthesis, characterization and antimicrobial studies of organotin(IV) complexes of N-methyl-N-phenyldithiocarbamate. Jerry O.Adeyemi, Damian C. Onwudiwe, Anthony C.Ekennia, Romanus C. Uwaoma, Eric C.Hosten. Inorg. Chim. Acta, 2018, 477, 148-159. DOI: 10.1016/j.ica.2018.02.034

20. Synthesis, Characterization and Computational Studies of Two Triazaspiro Tetracycles. Felix Odame, and Eric C. Hosten. Acta Chim. Slov. 2018, 65, 531-538. DOI: 10.17344/acsi.2017.4084

21. Synthesis, Characterization and DPPH Scavenging Activity of Some Benzimidazole Derivatives. Felix Odame, Jason Krause, Eric C. Hosten, Richard Betz, Kevin Lobb, Zenixole R., Tshentu and Carminita L. Frost. Bull. Chem. Soc. Ethiop., 2018, 32 (2), 271-284. DOI: 10.4314/bcse.v32i2.8

22. Synthesis, structural characterization, and thermal stability studies of heteroleptic cadmium(II) dithiocarbamate with different pyridyl groups. Damian C. Onwudiwe, Eric C. Hosten. J. Mol. Struct., 2018, 1152, 409-421. DOI: 10.1016/j.molstruc.2017.09.076

23. The crystal structure of 8-chloro-7-ethyl-1,3-dimethyl-1H-purine-2,6(3H,7H)-dione, C9H11ClN4O2. Syed Saeed Ali, Abdulrahman M. Al-Obaid, Eric C. Hosten and Ahmed Bari. Z. Kristallogr. NCS, 2018, 233 (2), 317-318. DOI: 10.1515/ncrs-2017-0314

24. Water and the relationship to the crystal structure stability of azithromycin. R.

Neglur, E. Hosten, M. Aucamp, W. Liebenberg, D. Grooff. J. Thermal Analysis and Calorimetry, 2018, 132, 373-384. DOI: 10.1007/s10973-017-6928-6

25. In-line FTIR: An analytical tool in continuous flow systems, R. Mangwiro and P. Watts, Chemica Oggi, 2018, 36(1), 25-33.

26. The agglomeration of coal fines using wet microalgae biomass, S. Gaqa and P. Watts, Journal of Energy in Southern Africa, 2018, 29(2), 43-50.

27. A study on the scale-up of acyl azide synthesis in various continuous flow reactors in homogeneous and biphasic systems, C.R. Sagandira and P. Watts, J. Flow Chem., 2018, 8(2), 69-79.

28. Flow Processing for API production in South Africa: Case Study towards the Synthesis of Emtricitabine, D. Mandala, S. Chada and P. Watts, Chemica Oggi, 2018, 36(5), 28-32.

29. HIV Integrase Inhibitors: Biochemical Evaluation, QSAR and Docking Studies, O.J. Jesumoroti, R. Klein and P. Watts, Medicinal Chemistry Reviews, 2018, in press.

30. Darrel Naidu, Percy Hlangothi, Maya Jacob John, Bio-based products from xylan: a review, Carbohydrate Polymers, 179, 28-41, 2018

31. Tshepiso Molaba, Steve Chapple, Maya Jacob John, Flame retardant treated flax fibre reinforced phenolic composites: aging and thermal characteristics, Fire and Materials 42 50-58 2018

32. Electrochemical Impedance Spectroscopy (EIS) study of doped spinel manganese cathode oxide materials synthesized for Li-ion batteries; C. Snyders and E.E. Ferg; Materials Today: Proceedings; 5 (2018) 10450-1045

32. Mfiso Mngomezulu, Rian Luyt, Steve Chapple, Maya Jacob John, “Studies on poly(lactic acid)/expandable graphite (PLA/EG) flame retardant composites” Journal of Renewable Materials 6 26-37 2018

33. Mfiso Mngomezulu, Rian Luyt, Steve Chapple, Maya Jacob John, “Effect of expandable graphite on thermal and flammability properties of poly(lactic acid)/ poly-ε-caprolactone blend systems” Polymer Engineering and Science, 58, 1619-1629, 2018

Books/Book Chapters

1. Mpho Lefatle, Maya Jacob John, “Mechanical, rheological and viscoelastic properties of polysaccharide and protein based aerogels” Biobased Aerogels: Polysaccharide and Protein-based Materials, RSC,ISBN: 9781782627654, 177-197, 2018
2. Vimla Paul, Maya Jacob John, Hybrid Biocomposites in book entitled, Biocomposites: Biomedical and Environmental Applications, Pan Stanford Publishing, ISBN 9789814774383, 2018
3. Mapoloko Mpho Phiri, Motshabi Alina Sibeko, Shanganyani Percy Hlangothi, Maya Jacob John “Waste rubber based composite foams” in book entitled, Rubber Recycling, Royal Society of Chemistry, ISBN:978-1-78801-084-9, 83-101, 2018
4. Mtibe A., Mokhothu T.H., John M.J., Mokhena T.C., Mochane M.J., Fabrication and Characterization of Various Engineered Nanomaterials, Handbook for Nanomaterials for Industrial Applications, Elsevier, ISBN No. 978-0-12-813351-4, 151-171, 2018
5. Phiri MM, Sibeko MA, Hlangothi SP & John MJ, Title: Waste rubber based composite foams, published in Rubber Recycling; Green Chemistry Series book by Royal Chemistry Society. Print publication date 03 Oct 2018, Copyright year 2019, Print ISBN: 978-1-78801-084-9, PDF eISBN: 978-1-78801-348-2, DOI: 10.1039/9781788013482; pages 83-101.

Conferences Attended and Papers Presented

Postgrads

1. Ntokozo Mdubeki, presented "DEVELOPMENT of COSMETIC PRODUCTS CONTAINING SPENT COFFEE EXTRACTS WITH POSSIBLE ANTIOXIDANT AND ANTICELLULITE PROPERTIES" - Ntokozo Mdubeki and Nicole Vorster, Coschem Conference 2018, Midrand, Johannesburg, 5-6th September 2018.

2. Motshabi Sibeko and Victor Agbakoba presented at the Department of Environmental Health Strategic Research Workshop held on the 24 and 25 May 2018. Presentation titles are as follows:

I. Dr Sibeko, South African integrated waste management plan for tyres: Health and environmental issues;
II. Victor Agbakoba, Carbon nanotubes in male latex condoms: An exciting prospect!.

3. Keith Nare presented at the SARF/IRF/ PIARC Regional Conference for Africa that took place at the Durban ICC from 9th – 11th October 2018

4. Keith Nare attended the 36th Road Pavements Forum held on 12 and 13 November 2018 at the CSIR International Conference Centre, Pretoria, Gauteng

5. Keith Nare presented a paper at the Asphalt Technology, (ICAT 2018), Prague in Czech Republic from the 24th -25th May 2018. Presentation was titled: Impact of Fischer-Tropsch Wax on Ethylene Vinyl Acetate/Waste Crumb Rubber Modified Bitumen: An Energy-Sustainability Nexus.

6. Motshabi Sibeko presented at the Analitika 2018 conference, Pretoria, from 26 – 31 July 2018.

7. Keith Nare attended the Society for Asphalt Technology(SOCSAT) Seminar at STIAS in Stellenbosch on the 2nd March 2018

8. Keith Nare presented at the Test and Measurement Conference & Workshop that took place in Somerset-West from 7th – 10th October 2018. Title: From crude oil to application; A low temperature and ageing nexus approach to material memory.

9. Mr Sendi Gandidzanwa (MSc student under Prof Tshentu) attended NanoAfrica 2018 and presented on "The development of palladium nanoparticles for radiopharmaceutical application". 7th International Conference on Nanoscience and Nanotechnology in Africa (NanoAfrica2018), April 2018. Durban South Africa. Oral presentation.

10. Ms Sinelizwi Joseph (MSc Nanoscience student under Prof Tshentu) also attended NanoAfrica 2018 and presented on "The development of rhenium (III) oxide nanoradiopharmaceuticals", 7th International Conference on Nanoscience and Nanotechnology in Africa (NanoAfrica2018), April 2018. Durban South Africa. Poster presentation.

12. Victor Agbakoba and Sisonke Ketelo presented at the international conference on composites, biocomposites and nanocomposites held from 7 – 9 November 2018 in Port Elizabeth.

13. Dr Olufunso Abosede attended the following:

I. Powder X-ray diffraction structural characterization and applications of cis -[CoII(κ_2N,N'-1,10-phenanthroline-5,6-dione)2Cl_2, 31st European Crystallographic Meeting, August 22-27, 2018, Oviedo, Asturias, Spain. **Poster presented**: Powder X-ray diffraction structural characterization of cis-[Co(phendione)$_2Cl_2$].
II. Single crystal Crystallography training, Matrac 1 School, September 2-7th, 2018 in Hamburg, Germany.

14. Dr Sibeko, South African integrated waste management plan for tyres: Health and environmental issues; presented at the Department of Environmental Health Strategic Research Workshop held on the 24 and 25 May 2018.

Academic Staff

1. Adeniyi S. Ogunlaja, Copper(II) and zinc (II) based metal–organic framework materials for desulfurization, 43rd National Convention of South African Chemical Institute, CSIR Pretoria, South Africa, 2-7th December 2018.
2. Dr Ogunlaja, presented Immunosensors in monitoring some environmental antigens - at the Department of Environmental Health Strategic Research Workshop, Nelson Mandela University held on the 24 and 25 May 2018.
3. Nicole Vorster, A comparison of the bioactive content, antioxidant capacity and antimicrobial activity of pomace extracts from two olive cultivars for application in cosmetic skincare products" – Nicole Vorster, Marthie Postma-Botha, Saartjie Roux, 30th IFSCC congress, Munich, Germany, 18-21 September 2018.
4. Nicole Vorster attended Workshops/ Training entitled: Microencapsulation – Europe 2018, Hamburg, Germany, 17-18 May 2018.
5. James Carson was invited to speak at the Porche Club-Eastern Cape on the 23rd April 2018. His talk was about the tyre manufacturing process as well as tyre rating (including the unique Porche –'N' rated tyres).
6. Lukanyo Bolo attended the Calorimetry and Thermal Analysis Summer School Training 2018 in Lyon, France from 17 – 22 June 2018.
7. Prof Zeni Tshentu delivered an invited lecture at Electrospin-2018 in Stellenbosch https://sncfibers.com/electrospin-2018/ . The title of the presentation was "Polymer nanofibers – design, function and application"
8. Prof. Zeni Tshentu also attended the International Symposium on Metal Complexes (ISMEC 2018) in Florence (Italy) from 2-7 June 2018. He contributed an oral presentation on "Biospeciation and anti-diabetic effects of oxidovanadium(IV) complexes.
9. Prof Zeni Tshentu will present a guest lecture at the 43rd National Convention of the South African Chemical Institute (2-7 December 2018). The theme of the conference is "Chemistry for a sustainable African Economy". He will present on "Integration of basic and applied chemistry towards valorisation of earth and secondary resources".

WATTS Conference presentations:

1. Invited Lecture, '*Integrated Continuous Flow Processing of Fine Chemical and Pharmaceutical Products'*, CPAC Rome Workshop: Utilization of new concepts in developing next generation materials, as well as exploring new reaction routes that benefit from the growing use of continuous flow technology, Rome, March 19-21 2018.
2. Invited Lecture, '*Can Flow Synthesis Enable Chemical and Pharmaceutical Provision in Africa?'*, CPAC Summer Institute: Next Generation Processing Approaches to Enable Maximum Efficiency in the Production of Pharmaceutics, Chemicals, and Biomaterials, Seattle, July 17-19 2018.
3. Invited Lecture, '*Capacity development for API manufacturing in Africa'*, Grand Challenges Annual Meeting 2018, Berlin, October 15-18 2018.

Keynote Lecture, '*API manufacturing in Africa'*, Biotechnology Innovation & Regulatory Science, Kilimanjaro, Tanzania, October 29 - November 2 2018.

Emeritus

1. Professor Loyson delivered a lecture on "The Ptolemies of Ancient Egypt" for the Ancient History Society of PE on the 6th of February,2018 at the Italian Club of PE.

2. Professor Loyson delivered a lecture on "Leonardo da Vinci: Super-genius" at the Intalian Culture Club of PE on the 27th of March 2018.

3. Professor Loyson presented “From disunity to unity: A long way of woman’s integration into the scientific community (17-19th Century)” at the London University (UCL) on the 16th of September of 2018.

Research Centre

The Centre for Rubber Science and Technology (CRST)

From the Director: Dr Shanganyane P. Hlangothi The Centre for Rubber Science and Technology (CRST) draws on Nelson Mandela in chemical rubber science and technology. Its activities include the advancement of rubber related research and development programs across various disciplines such as Chemistry, Environmental Science and Computer Science; training for the needs of the rubber and tyre manufacturing industries within South Africa; and providing analytical and technical services to the South African rubber and tyre manufacturing and recycling industries. For more information about the Centre for Rubber Science and Technology, visit the website: https://crst.mandela.ac.za/About-Us

uYilo e-Mobility Technology Innovatio Programme

The uYilo e-Mobility Technology Innovation Programme (EMTIP) is part of the government’s Technology Innovation Agency (TIA) initiatives to expand the development of the electric vehicle (EV) industry in South Africa and is into its 6th year of activity at the Nelson Mandela University. The programme continues to give support to a range of niche applications that ranges from full sized battery driven electric vehicles, charging infrastructure to e-bikes. The various actives of uYilo are described on their web page: **uyilo**.org.za/

In 2018, the battery facility of uYilo had two more staff members joining the group. Gavin Constance is busy completing his analytical chemistry diploma IST year and is working primarily in the battery testing laboratory, where he engages with battery manufacturers to evaluate their batteries according to a range of international specifications. Dr Xandri van Niekerk joined the group in February to head up the research initiatives of the group as well as help out with lecturing while Prof Ferg was on research sabbatical leave. Her role within the group was to coordinate the materials analysis laboratory that is located in the

chemistry department. This includes giving support to the post-graduate and under-graduate trainee students as well as a range of analytical services that are provided for other researchers in the department and industry.

The battery group has a SANAS 17025 (ISO) accredited testing laboratory for both lead-acid starter battery as well as for lithium-ion batteries used in industrial applications. It is the only battery testing laboratory in South Africa that can provide accredited testing for lithium-ion type batteries. The laboratory accreditation implies that any battery analysis that the laboratory undertakes would follow the strict guidelines of an ISO quality system in terms of providing accurate and reliable results to the customer. Recently, the laboratory is receiving a lot of batteries testing requirements from the local batteries companies, particularly for batteries that are used in the new motor vehicles' Start/Stop applications. This testing sequence is relatively complex and requires specialized battery testing equipment that is able to discharge the battery at high currents of up to 300 A for 1 second, followed by a short one minute recharge at 100A. This testing sequence is repeated thousands of time until the battery either fails or had achieved a certain number of cycles as specified by the international specification. These tests are all done in a controlled temperature testing environment.

uYilo hosted another successful "Batteries and Electric Vehicles Conference 2018" from the 29th to 30th of October. There were a number of local and international speakers that spoke on a range of topics from lithium-ion battery recycling to global battery market trends and the role of local government and funding agencies in the development of the EV market in South Africa.

In 2018, the battery testing laboratory was awarded THRIP funding for a collaborative battery development project to look at lithium ion battery development in South Africa. THRIP funding is granted by government to help accelerate the industrialization of certain technologies that are in partnership with local research institutions and industry. This project looks at developing and manufacture local cylindrical lithium ion cells with the University of the Western Cape (UWC), the CSIR, Zellow Technology and First National Batteries. The project will run over the next three years and the part for the uYilo battery group will be to not only evaluate the capacity performance of the cells that are locally made, but also to evaluate their respective safety characteristics by subjecting them to a range of specified destructive or abuse testing. These types of tests are required by all suppliers of lithium ion cells that make use of highly specialized equipment to subject the lithium ion cells to typical conditions that are specified in the UN Transport of Dangerous Goods Specifications (Section 38.3). These include nail penetration, short circuiting, altitude simulation, thermal and vibration resistance and impact or crush tests. The battery testing laboratory will be ordering the necessary equipment by the end of 2018. During this year, the battery group has also purchased a high voltage (100V) battery tester that will help evaluate larger battery modules that are built by engineers for a range of

applications such as e-bikes, autonomous guided vehicles (AGV), micro-hybrid vehicles and others. The battery tester should be arriving in November 2018 and be commissioned within the next 6 months.

In 2018 the uYilo battery group supported two analytical diploma students to complete their practical in-service training (IST) year. They were Jaqu-Mari Human that worked on a project with the title “Comparative study on various diffraction methods to determine the amount of retained austenite in steel” in partnership with a local industry and NECSA. The other student was Lunathi Ntonintishi that worked on a project “The use of Electrochemical Impendence Spectroscopy to study the coating thickness of metals” that is a relevant for the understanding of rust prevention in the iron-steel industry. Gavin Constance IST project title was “The standardization of the lead acid single plate testing and its oxides by X-ray diffraction” and was in collaboration with a local lead acid battery company. The battery group is interdisciplinary in its research endeavors and supported the project of a final year Mechatronics student Francis Le Roux that developed a battery management systems (BMS) for cylindrical lithium-ion cells to build a 12V starter battery for vehicles. The battery group also supported Christopher Sephton to complete his Masters project in Mechatronics to develop an inductive charging system for e-bikes.

In 2018, Nomasonto Rapulenyane completed her doctoral study in chemistry with the title “Development of high capacity lithium-manganese-rich cathode materials xLi2MnO3•(1-x)LiMn0.5Ni0.5O2 for lithium ion batteries”. The work was in collaboration with the Energy Storage group at the CSIR in Pretoria that looked at the development of new materials for their use in lithium ion batteries. From her work, she successfully published one paper in a peer reviewed journal, two filed South African patens and she presented aspects of her work at four local conferences. She will walk the stage in December 2018.

In 2018, Princeton Pillay completed his MSc in textile science with the title “Reducing the brittleness of poly-furfuryl alcohol resin used in composites”. The work was in collaboration with the Textile group at the CSIR in Port Elizabeth that looks at the development of composite materials. He will be walking the stage in December 2018.

In 2018, Zipporah Madikane complete her MSc in Nanoscience with the title “Investigation of the behavior of lead in contact with carbon nanofiber additive at the negative active material”. She walked the stage in April 2018.

Innoventon: Institute for Chemical Technology

Dr Gary Dugmore

InnoVenton: Institute for Chemical Technology is a formally registered Research Institute at the Nelson Mandela University whose principle research focus is in Product and Process Development. The Institute strives to establish and grow its activities in the areas of services to industries, training and research. The staff and students continue to build on the legacy left to us by InnoVenton's founder, Prof Ben Zeelie. New Appointments at InnoVenton

Mr Peter Grant, a formerly from EHL Consulting Engineers, was appointed as a Project Scientist in the Technology Station Activity.

Mrs Shamimah Balkissoon, formally from The Image Factor, was appointed as InnoVenton's Administrative Assistant and Secretary.

Mr Mofo Setloboko, formally from the Lesotho police forensic laboratories, was appointed as a Research Analytical Scientist.

A Microalgae Technical Demonstration Facility is housed at InnoVenton and forms the basis for the DST-funded Microalgae-toEnergy Technologies project that includes a Microalgae Technologies Research Centre. The project has achieved significant breakthroughs and world-first in microalgae cultivation and processing with discard coal fines (Coalgae® technology), which have generated a number of patents. InnoVenton's novel, patented microalgae cultivation system has achieved improved productivities compared to conventional raceway systems, which in turn lowers the cost of production. When microalgae are added to waste coal fines, a superior solid fuel with a renewable biomass fraction, called Coalgae® can be derived. Independent tests have demonstrated its improved performance over the native coal in combustion systems. Coalgae® can be further processed to yield a lowsmoke household fuel, as well as liquid fuels (e.g. diesel and aviation fuel). Several other technologies are being explored, with the research, development and commercialization focused on three broad themes, namely

(1) microalgae cultivation,
(2) renewable energies, and
(3) biomass processing.

Examples include the use of microalgae as a bio-fertilizer and soil conditioner. The high protein content of microalgae means the product is an attractive animal feed ingredient, and the protein can also be extracted for food applications. The Downstream Chemicals Technology Station activity is based at InnoVenton, there are two Major Project initiatives at the Station. The first under the DST Theme; Expanding Geographical Footprint, is the establishment and development of a so-called Agro-Refinery for the latent Cactus Pear industry. The project aims to establish an entire Agro -Refinery concept round the cultivation, harvesting and processing and produc
tion of consumer products from all the main components of the cactus pear. The second is under the DST Theme; Industrial Growth, and comprises of three projects, namely:

- A process to be developed to extract and purify inulin from locally grown chicory root at Chicory South Africa.
- The development of flower preservation techniques and transpiration formulations with local Fynbos plants for Nikwaflora.
- The development of a range of coffee - based beverages using a cold-brew process, develop quality assurance protocols for the cold-brew extract, evaluate methods to improve the shelf

-life of the final beverage, and to beneficiate the coffee grounds resulting from the cold-brew process.

The Teaching and Learning activity at InnoVenton has continued to offer our students Formal Training and Short courses which have focused on the needs of local industry. InnoVenton is looking to broaden its base of interaction with the University's academic community by offering opportunities for University promoters to supervise and co-supervise some of the Post Graduate Research Students who are working on projects linked to our research themes. For further information please go to http://innoventondcts.mandela.ac.za/

Research Chair: Microfluidic Bio-chemical Processing

The overall research aim of the Chair is to develop a continuous flow methodology to investigate how small production platforms can enhance chemical manufacture within the South African economy. In addition, research will be undertaken to investigate the integration of synthesis and purification within continuous flow systems.

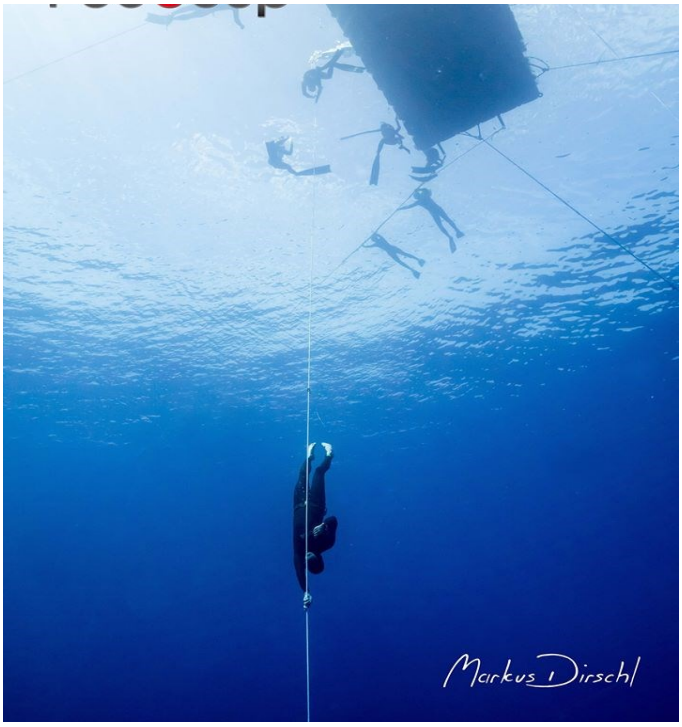
Prof Paul Watts

Research interests include:

Micro reactor and continuous flow synthesis;
- Green chemistry;
- Process intensification and process analytical technology;
- Pharmaceutical manufacture;
- Catalysis (and biocatalysis) in continuous flow reactors;
- Drug formulation;
- Nanochemistry.

For further information, please go to:
http://research.mandela.ac.za/Research-Chairs/Chair-in-Micro-fluidic-Bio-Chemical-Processing

Other News



Dr. Gletywn Rubidge had a successful visit to the Red Sea, starting with a week of good hard training and then participating in the competition. He managed to bring home the two SA freediving records. On the first day he did 70 meters by free immersion (pulling down the rope and back up). The second day he succeeded with an 86 m dive with a monofin. Unfortunately the third day was cancelled due to weather.

Promotions (2018)

1. Benita Barton (senior lecturer to associate professor)
2. Percy Hlangothi (lecturer to senior lecturer)
3. Richard Betz (lecturer to senior lecturer)
4. Abubakr Abrahams (lecturer to senior lecturer)

Appointments

Sasha-Lee Dorfling was born in Port Elizabeth, South Africa in 1991. She received her BSc (2012), BSc (Hons) (2013), MSc (2014) and PhD (2017) degrees here at Nelson Mandela University. Thereafter, she joined the chemistry department as a first-year chemistry lecturer while focusing on organic chemistry and chemical education research. Sasha-Lee is passionate about moulding and influencing first year students and hopes to make an impact on their gratification for the beauty that is chemistry. Her education research focuses on the difficulties associated with low science pass rates in South African high schools and is eager to fix this problem. With her role as a lecturer and researcher at this university, she states that she is living her ultimate best life

Appointments (Innoventon)

Mr Luvuyo Ndyenga, appointed as a Process Technician, completed a Diploma in Chemical Process Technology in 2018 at the Nelson Mandela University. He has been working with the Microalgae to Energy Team and has gained experience in cultivating, monitoring and maintenance of the Microalgae greenhouse raceway population. As Process Technician for the DST Project, he assists with various aspects of the practical cultivation of microalgae. Luvuyo will be responsible for the monitoring and maintenance of the health of the microalgae population in the photo bioreactors. His biggest challenge, however, will be to collect samples from the raceway pond on a daily basis, building a data set, to predict and control the health of the microalgae population. Luvuyo also likes to Braai.

Mr Michael Muller has been appointed as a Process Technician at InnoVenton. Michael has taken responsibility for the cultivation of micro-algae for the purpose of Coalgae® production as well as supplying other projects in need of algae. He is also responsible for the cultivation of Spirulina with the development of a tray cultivation system. He completed a Chemical Process Technology Diploma from the Nelson Mandela University and came to us to complete an internship. His biggest challenge, however, will be to ensure smooth production of micro-algae by controlling contamination of rotifers that diminish algae growth and cause culture crashes. Michael likes fast cars.

Mr Marcio Agulhas has been appointed as a Process Technician at InnoVenton. Marcio has taken responsibility in the area of microalgae cultivation, spray drying Coalgae, and assisting with algae raceway system improvements together with Mr JJ De Jongh. He has a diploma as a Chemical Process Technologist from the Nelson Mandela University and came to us to complete an in-service training internship.
His biggest challenge, however, will be to assist and gain experience on some of the aspects of the pyrolysis work and continue with activities in the Micro -algae greenhouse facility.

Mr Sifundo Duma has been appointed as a Research technician at InnoVenton. Sifundo has taken responsibility for research projects within the thermochemical processing of Coalgae ® to liquid fuels as well as carrying out operational activities to support the research work. He has a degree in Chemical Engineering from the Cape Peninsula University of Technology and came to us to complete an internship. His biggest challenge, however will be Fischer Tropsch synthesis of syngas from Coalgae ® and completing his Masters.

THE UNVEILING OF REPURPOSED HOD PHOTOGRAPHS AND END OF THE YEAR FUNCTION

Prof Peter Loyson unveils PE Tech HOD's

On Friday, 30th November 2018, the Department of Chemistry at the Nelson Mandela University held its "Unveiling of HOD photographs" event, followed by the end year function at the Science Building, Auditorium on South Campus.

The purpose of the event was to unveil photographs of the former Heads of Department who served in the Department of Chemistry since its inception; this includes Port Elizabeth College, Port Elizabeth Technikon, University of Port Elizabeth and Nelson Mandela University. This event also served as the end of the year function for the Chemistry staff.
Mr Nehemiah Latolla was the Master of Ceremony and amongst the attendees were students and staff. Prof Gill Dealtry did the welcome speech and shared a brief history of the Department of Chemistry from the PE Technical College days until the present Nelson Mandela University. The unveiling of HOD pictures were presented in the following order.

· PE College and PE Technikon by Prof Peter Loyson.
· University of Port Elizabeth by Prof Cedric McCleland.
· Nelson Mandela Metropolitan University by Dr Bennie van Brecht and Prof Zenixole Tshentu.
· Nelson Mandela University by Prof Ernst Ferg and Ms Anita Noah.

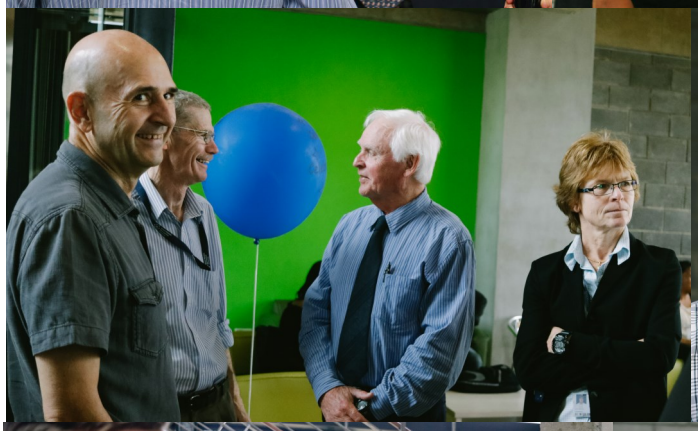
Prof Zenixole Tshentu gave his keynote speech as the outgoing Head of Department (2016-2018). He thanked his staff for their hard work and support during his term. The event was followed by the end of the year function.

Pictures of the HOD's since the Department of Chemistry's inception are on the last page.

Pictures from the 2018 Year-End Function








Top - (PE Technical College)
From left - Mr Alexander Garner (1928-1930), Mr Thomas James (1930-1950), Mr Chris Price (1951-1956), Mr JR Potgieter (1957-1958), Mr JE Potgieter (1958-1960), Mr Terence McCarthy (1960-1967),

Middle
From left - Dr Bruce Ilsley (1967-1968) (PE Technical College), Prof A Goosen (1968-1969, 1975-1977, 1981-1985, 1987-1993) (UPE), Prof JGH du Preez (1970-1972, 1980, 1986) (UPE), Mr JP Wagenaar (1970-1973), Mr Dave Warren (1974-1978) (Coolege for Advanced Technical Education), Prof P Loyson (1980-1995) (PE Technical)

Bottom
From left - Prof B Zeelie (1996-2004) (PE Technical), Prof WJ McGill (1994-1997) (UPE), Prof CW McCleland (1997-2004) (UPE), Prof TIA Gerber (2010-2015), (NMMU) Prof Z Tshentu (2016-2018) (NMMU/NMU)

Newsletter Editorial Team

Dear student and staff of the department of chemistry, without your contributions a newsletter is not possible. For this reason, I would like to invite everyone to send contributions to me in good time before the next newsletter. I wish you all a peaceful, happy, healthy, progressive and successful year in 2019.

This newsletter was put together by Andisile Klaas, who serves as the PR and Marketing Intern for the Department of Chemistry