InnoVenton Times

January 2025

2024— Wanna Be Startin' Somethin' __Michael Jackson

Letter from the Editor…

Welcome to the 2024 edition of the: "InnoVenton Times".

With our New Mission Statement in mind…

The mission and strategic objectives of DCTS are Technology Innovation and Development improvement for competitive advantage in the South African Downstream Chemical Industry.

InnoVenton has focused on engagements with industry and SME's in the area of technology development for products and processes as part of the path to commercialization. Our general testing services continue to offer problem solving and mainstream analysis for local companies who need support in this area. Following a clean audit, InnoVenton maintained the SABS ISO 9001 Certification for its' quality management system. Consistent, diligent work from the team makes this possible. We also take a look at some of the activities promoted by the Technology Station Program and some of the Technology Development Projects completed during the year. Worth a mention are the KiloLab production facility and 3 fine chemicals product development projects undertaken during the year, the progress achieved is elaborated on in the articles included. The Green Hydrogen Project gained momentum this year, an update is included for those who are keen on developments in catalysts used for the hydrogen economy.

Personal Care Product development projects that gained momentum last year continue to draw interest from clients. The targeted training and partnerships with agencies like the Hope Factory and the Chieta have enabled targeted business development training and practical product formulation support.

InnoVenton continues to offer an array of SLP's and Workshops for companies, SME's and individuals. A new Fragrance formulation workshop is under development, so watch that space. If you would like to sign up for one of these learning opportunities or check out what else we have on offer in 2025 you can follow our website or Facebook page for updates.

The Formulation Science students continue to inspire new innovative " Dragons' Den" ideas in product formulation and the Chemical Process Technology students gained experience in developing their own cheese manufacturing process.

InnoVenton
Dream. Innovate. Create.

We give a fond farewell to our famous ***Microalgae project***, look back at the path followed and the future it holds. Acknowledging this huge body of work, the milestones and the people who contributed to the Dream.

InnoVenton hosted 5 Interns, 4 Student consultants and 6 Chemical Process Technology IST's, not to mention the post graduate students that make use of our expertise and assistance. Every year we create opportunities for young chemists and process technicians who can apply to participate in this skills development initiative.

Opportunities to market InnoVenton were snapped up by staff and students who either presented a talk or engaged with associates in common areas of interest, you'll find a spread of these engagement activities to enjoy.

Naturally, our stakeholders play a pivotal role in ensuring the sustainability of the institute and enable us to contribute our expertise to several areas in the Chemical Technology Development space. So, we would like to acknowledge the role that the Technology Innovation Agency and the Department of Science, Technology and Innovation play. You set the tone and create a platform for institutes and technology stations to exist and offer a service to our country's citizens. The Nelson Mandela University supplies the support systems that keep a technology institute like ours connected to the academic pulse. Special Thanks to our suppliers, your commitment helping us meet tight deadlines goes a long way towards improving our ability to deliver to our clients.

In 2025 we celebrate our 20th Anniversary, to all the staff, students and colleagues who have played a part in our sustainability, creativity and ingenuity, we say Thank you.

"You can do what you have to do and sometimes you can do it even better than you think." _Jimmy Carter

Once again…Delight and surprise our customers. Amaze our stakeholders. And consider, "Tremendous progress can be made if we persist through difficult challenges." (Melissa c/o – Jimmy Carter, US President)

CHEMICAL INDUSTRY

ENGAGEMENTS Towards commercial production

__L. Hamilton and Dr G. Dugmore,

From the 1950s South Africa began to utilise its coal reserves through commercialising coal gasification using Fischer-Tropsch synthesis (Sasol's coal-to-liquid processes) to produce liquid fuels and form a basis for the country's chemical industry. During South Africa's economic isolation of the apartheid years, chemical manufacturing plants in South Africa were built to satisfy only local demand. However, once the country opened up post-apartheid, its economy faced the competition of global markets. Lacking the necessary economies of scale to operate at this level, many South African chemical manufacturing operations in fine and speciality chemicals were uncompetitive, leading to a sharp decline in manufacturing. However, the needs of global markets have changed in light of recent geopolitical developments, which have disrupted global supply chains. Industry has recognised that dependence on imports for production inputs is a major risk, which could be mitigated by re-localisation of production.

InnoVenton, Nelson Mandela University's Institute for Chemical Technology, has engaged with local and international industry, to research their response to upscaling the development of chemical manufacturing of fine and speciality chemicals in South Africa. The country's industrial base, raw materials, and feedstocks provide a timely opportunity to develop competitive technologies to re-industrialise its fine chemical manufacturing sub-sector, contributing to economic growth and job creation, raising aggregate domestic demand and exports, and supporting the country's National Strategic Objectives.

Innoventon's engagement with industry and SMEs has led to the identification of products with high potential to be commercialised through manufacture in South Africa. Given the investment in time and resources, the importance of the initial selection of products and/or technology for further development, cannot be overstated. Engagement with the greater industry sector is essential to ensure that there is market demand to provide a business case. InnoVenton scientists review and evaluate available technologies and formulate a synthetic route which could meet the commercial objectives. The technology is ready for licensing to the most suitable, previously identified commercial partner once techno-economic criteria are met and development has progressed as far as possible at InnoVenton.

Photo: Radleys Single jacketed 1 L Process Reactor for laboratory scale up in a plant-simulated environment.

Where technologies require further development prior to commercial operations (e.g. Industrial Pilot Plant scale trials), a development license may be granted, and the necessary further external development supported by InnoVenton through Technology Transfer activities co-ordinated through the University's Technology Transfer Office. The skills required for the successful development of process technology in the fine and speciality chemical manufacturing industry are extremely scarce. InnoVenton is actively involved in mentoring and upskilling postgraduates through work on industry and technology development projects, allowing them to apply theoretical and academic experience to innovating around commercially relevant technologies. We offer workshops and short learning programmes to students and unemployed graduates, to broaden their understanding of chemical process technology development and to nurture skills such as the techno-economic assessment of potential technologies at appropriate levels of detail or certainty. Chemical process technology development also requires appropriate workspaces, laboratory facilities, and specialised equipment, so at InnoVenton we continue to invest in modern equipment and facilities to support chemical process technology development and re-industrialisation of fine and speciality chemical manufacturing in South Africa.

InnoVenton Kilolab

Capabilities

In line with our Mission, which is to enable "Technology Innovation and Development improvement for competitive advantage in the South African Downstream Chemical Industry". InnoVenton is building capacity, expertise and assets in our Kilo Lab Facility. This facility is one of-a-kind on the African continent based at an academic institution. Positioned in Gqeberha, (Port Elizabeth) gives us the opportunity to lend support to emerging chemical manufacturing companies locally in the Eastern Cape and Nationally. Three major projects have benefited from this asset which will be presented in articles in this edition. Transferring skills and knowledge in this area of expertise is an ongoing process, building experience takes time and persistence.

The opportunity still exists for companies to start manufacturing materials locally for the South African market, where support is needed with respect to technical chemical interventions, InnoVenton is in a unique position to assist. We talk about revitalizing the chemical industry, and that's a big vision, it can only be achieved if awareness about what we do and can offer is made more widely known in the chemical sector. InnoVenton engages with clients, offers feasibility studies and provides technical expertise as required. Some of the outputs have come in the form of Technology Transfer packages which can be used by the clients as a roadmap for their requirements. Let's take a look at some of the work InnoVenton has been doing over the last year in this specialized area…

Kilo Lab small scale manufacturing

_ Dr Gary Dugmore, Jarryd Cuthbertson, Olebogeng Mogapi

Essential Sterolin Products namely, β-sitosterol-β-D-glucopyranoside was manufactured using the kilo lab facility located at InnoVenton. The BSSG product meets quality specifications, and the process has been optimised and documented. A total of 20 kg will have been manufactured for the client by the end of the year. Quality control and product quality methods to provide a CoA will be developed.

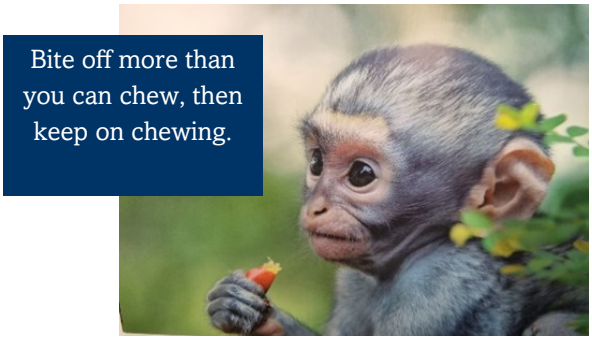
Photos: Manufacture of 20 kg β-sitosterol-β-D-glucopyranoside

Prototype sample manufacturing of non-ortho phthalate plasticizers

_Dr Gary Dugmore

Isegen asked DCTS to assist with rapid laboratory scale prototyping of two different plasticisers, i.e.: triocyl trimellitate (TOTM) and dioctyl terephthalate (DOTP). These are non-ortho phthalate plasticizers, which have a significantly reduced environmental impact, low toxicity which leads to greater health and safety in packaging, medical devices and the automotive industry. Over 6 months, DCTS produced 5 further prototypes of 2 different products for Isegen. The prototypes were to test processing methods used to manufacture DOTP and the effect different raw materials had on the colour of TOTM.

Photo: Plasticizer products- example where they are used.



Push to Commercialization

_Jarryd Cuthbertson, Dr Gary Dugmore

Chemical Process Development of a fine/speciality chemical in a re-industrialization project. This herbicide active is used to control bush encroachment in rangeland. A rigorous process of development was undertaken in the kilo lab, where critical process parameters were identified to understand the process, factors affecting the yield and purity, i.e.: reaction kinetics, side reactions. To date, a technology description of the laboratory scale process for the synthesis of Tebuthiuron at technology readiness level (TRL) 4 has been disclosed as know-how to the Innovation Office. The information is sufficient to effect transfer to a skilled chemist to repeat this process in the laboratory and for a chemical engineer to develop preliminary plant design and costing for techno-economic evaluation.

Further de-risking of the technology to progress the technology through TRL5 (integrated process tested in a simulated pilot), is currently being undertaken at DCTS. The Technology has been transferred to Innovolve, the commercialization vehicle of Nelson Mandela University for licencing purposes. And interested commercial partners have been invited to submit proposals.

Kilogram Scale Pilot Plant Upgrades:

Holding Tanks and PFA Valves and Tubing, below -Two 10L and one 50L Glass Holding vessels have been added along with the necessary scaffolding. This will enable safe and contamination free transfer of reaction mixtures and solvents during chemical synthesis.

Perfluoro alkoxy (PFA) valves and tubing, PFA valves and tubing have exceptional properties and versatility. Among the different types of fluoropolymers, PFA exhibits extraordinary resistance to chemicals such as acids, bases, solvents, fuels, and corrosive substances. This makes it ideal for applications involving aggressive chemicals or environments where contamination must be avoided.

InnoVenton

Technology and

Specialized Development

InnoVenton/DCTS strives to provide specific technology support and innovation in the areas of:

♦ ***Research***

- Applied Chemistry in Product and Process Development

♦ ***Teaching and Learning***

- Short learning programs, workshops.

♦ ***Engagement and Services***

- Technology Support
- Technology Demonstration
- Analytical and testing services

Our experts are willing to assess and assist you with your process and development requirements.

Chemical Process Technology Development SLP Scale Up: *Grams to Kilograms*

What the course covers:

- **Research vs Development; initiation of Chemical Process Technology Development**
- **Technology Development stages and Technology Readiness Levels**
- **Justification for investment**
- **Scale up factors for the process chemist to consider and be aware of: Multipurpose Batch reactors, Separations at scale; Monitoring & Control; solvent recover; sampling; crystallization; chromatography**
- **Other factors: stability; thermochemical/reactive chemical hazards; toxicity; raw materials; telescoping, safety; environmental issues**

Who would benefit:

- **Anyone involved in Chemical Process Laboratory development**
- **Anyone who would like to develop a broad understanding of Chemical Process Development Scale Up & commercialization challenges.**

InnoVenton

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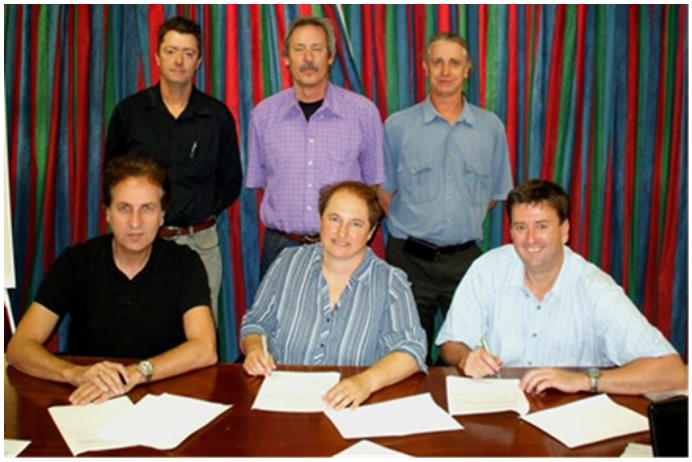
NELSON MANDELA UNIVERSITY

A Fond Farewell to Microalgae

How it started…

On December 16th 2008 NMMU and Phytolutions GmbH, a company jointly owned by Jacobs University of Bremen and local investors, signed a memorandum of understanding to form a JV company in SA to develop and promote this technology in Africa, including the conversion of the resultant biomass into high value production of biofuels, bioactive substances, chemicals, high protein food, building materials and bio-plastics, using the Institute's technology in bio-processing.



At the signing above were, seated from the left: Prof Dr Stefan Rill CEO, Phytolutions GmbH, Mrs Jaci Barnett Director: Innovation Support and Technology Transfer; Andrew Barton of the InnoVenton Staff Trust, and standing from the left, Dr Gary Dugmore of InnoVenton, Dr Gert Petrick of Jacobs University, and Prof Ben Zeelie, Director of the School of Chemistry and Biomolecular Sciences at NMMU.

The original plan….

The proposed R&D plan included the installation and demonstration of a 200m2 photobioreactor at NMMU by end June 2009, capable of producing 8-10 tons of dry biomass per annum. This would be followed in early 2010 by the establishment of two 1000m2 reactors situated at sites adjacent to local client industries, to evaluate the technology in industrial applications.

These will be similar to the unit illustrated, which is one of two on test at major coal-powered electricity utilities in Germany.

It was envisaged that within 2 years units would be available, sized to match client CO_2 mitigation targets at SA industrial plants, and regional bio-refineries will be established to process the resultant biomass. The business model from the outset was based on economic sustainability of both the bioreactor systems, in terms of the value of the biomass produced, tied to international crude oil price, and the carbon credits earned by the industrial producer through CO_2 mitigation, and the biorefinery which would process the biomass into value added fuels, chemicals, materials and protein rich feeds, as separate business operations.

How it went… So, by 2012… InnoVenton had achieved the following:

Microalgae cultivation platform – This platform comprises an area of approximately 500 m2 on the Gomery Avenue site and is the only large-scale photo-bioreactor (PBR) facility for microalgae cultivation in South Africa.

Collaborations established with Department of Science and Technology via TIA (late generation biofuels) Eskom (clean coal technology and bio-oil production). As part of this initiative, the Institute has developed a concept microalgae cultivation – clean water recovery – biogas for energy – bio-fertiliser for gardening system which has been displayed at the institute.

Presented a concept microalgae cultivation – clean water recovery – biogas for energy – bio-fertiliser for gardening system, at COP-17 conference in Durban

InnoVenton's work on microalgae to energy has played a significant role in defining the faculty's "Renewable Energy" research theme, and the "Strategic energy technologies" institutional research theme.

From 2012 to 2021…

Produced IP (patents) related to the recovery and agglomeration of waste coal fines through adsorption of microalgae, which further serves as a binding agent and biomass component of a waste fossil fuel.

Trademarked Coalgae®

Received substantial funding from DST's Technology Innovation Program: Hydrogen & Energy under the Transport Fuels directorate.

Coalgae® Demonstration plant constructed

5 tons of Coalgae produced for Testing

Qualified Coalgae® as a technically suitable and economically viable material for conversion to liquid transport fuels.

Developed and built a chemical and biological monitoring cell phone based 4IR process control and monitoring system

Set up a fixed bed atmospheric pressure gasifier and syngas analysis system which can be used for coal, coal-biomass blends and biomass gasification. This is the only scientific test gasifier in South Africa, available for contract research.

Fixed bed catalytic process reactor (for FT or any other heterogenous catalytic processes up to 40bar pressure)

Commissioned and set up facilities to host a high pressure and temperature hydrotreating catalytic reactor system for fossil and bio-fuel processing such as converting vegetable oils to oxygenate free biodiesel. This is the only such system in the country.

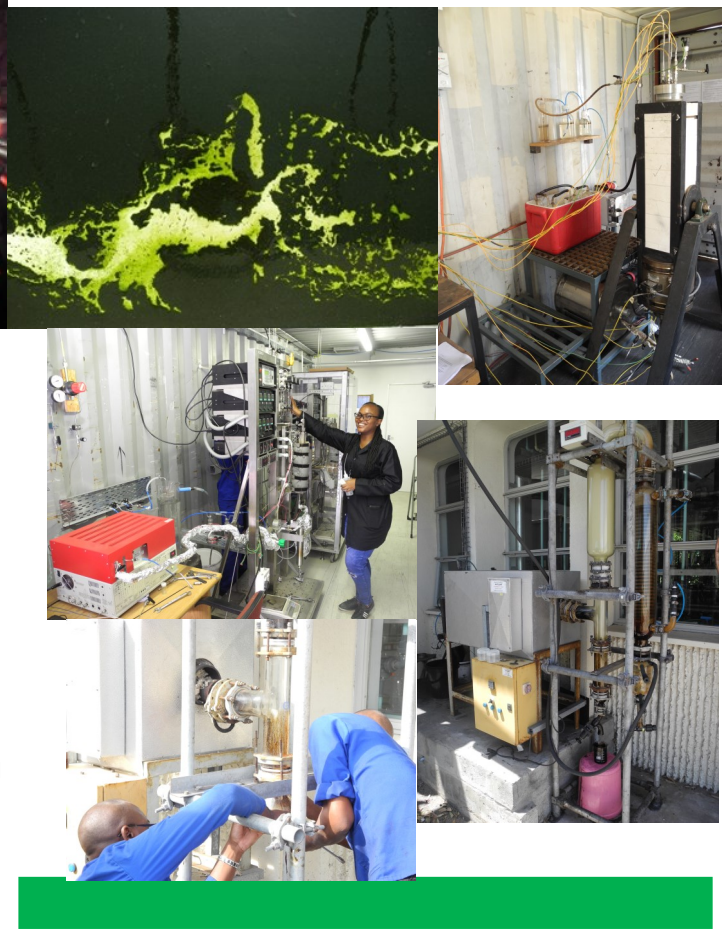
From 2022 to 2024…

Investigated and did technoeconomic assessments on various higher value products from microalgae biomass.

Algal Biorefinery Support Programme funded as a way forward to commercialize technologies previously developed.

Documented and disclosed 10 microalgae-based process and product technologies, as Technology transfer packages to Mandela Innovation Office for licencing and dissemination.

Initiated the drive to establish a Microalgae Forum, this will impact the future development and commercialisation of microalgae technologies and enhance cooperative and multidisciplinary engagement across the many sectors and industries.



Along the way there were Awards and recognition...

2012 NMMU Engagement Excellence Award

2015: DST Innovation Bridge Award for “Technology most likely to impact public spending”

2017 Parliamentary Congratulations Motion – Pioneering Microalgae to Energy Project

2019 – NIPMO Top Intellectual Property Creator Award: Most actionable disclosures (2010 -2018)

2023 Nelson Mandela University Team Innovation Excellence Award

Skills and Human resource development

5 Master’s graduates, 24 interns and in-service trainees; 8 PhD graduates; 3 Post Doctoral Fellows

Knowledge based Outputs

6 publications.

37 Conference Proceeding

6 patents, (Granted in South Africa, Australia, China, Germany, Spain, France, UK, Greece, Indonesia, India, Italy, Portugal, Turkey, Netherlands, US)

1 registered trademark (Coalgae®)

10 Technology Transfer Packages (Algae Manure, Bio stimulant Lysate, Coalgae ®, Low Smoke Fuel, Phycocyanin, Scenedesmus Raceway Cultivation, Spirulina Raceway Cultivation, Spirulina Bucket Cultivation, Whole Spirulina Fish feed)

Services and satellite projects

Investigating Spirulina growth systems for a private entrepreneur

Astaxanthin from Haematococcus

Phycocyanin from Spirulina

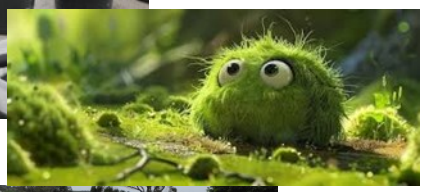
Spirulina bucket cultivation system

Spirulina as a source of renewable protein in fish feed for aquaculture

Oil extraction for use as an additive Polypropylene extrusion

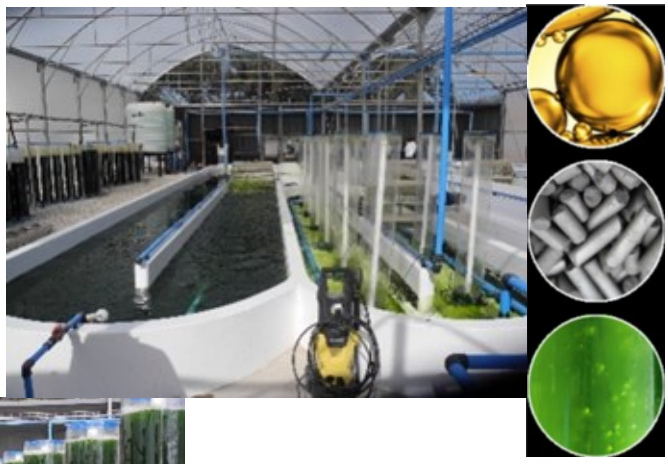
Bio stimulant extract from Spirulina

Collaboration with for Omnia water remediation and bio stimulant production with microalgae

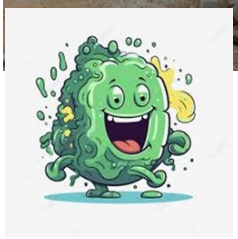


In conclusion, Microalgae elevated the status, nationally and internationally, of both the fledgling merged "comprehensive" Nelson Mandela Metropolitan University and the newly established Institute for Chemical Technology: InnoVenton. Microalgae and related research contracts have attracted approximately R64 million into the University, over the course of 15 years. It has been a huge part of the history and fortunes of InnoVenton and has afforded numerous students, staff and academics opportunities, and ultimately will have a lasting effect on the microalgae landscape in South Africa.

It is our belief that InnoVenton has taken Microalgae as far as we can, and the time is right to hand it over to collaborators and partners, who will further the research and drive the commercial outputs.



Gone, but not forgotten…



The Team that made the Dream Work: Prof Ben Zeelie, Dr Gary Dugmore, Dr Carla Kampman, Mr Philip van Zyl, Mr Geoff Ritson, Mr Brian Tait, Mr Otto Lessing, Mr Peter Grant, Mr Derek Hislop, Dr Shaka Shabangu, Dr Jackie Collins, Dr Nicole Vorster, Dr Shawn Gouws, Mr Coos Bosma, Dr Melissa Gouws, Mrs Louise Hamilton, Mrs Cecilia Saunders, Mrs Margriet Bosma, Dr Candice Davison, Mr Unathi Plaatjies, Mrs Mildred Mpalala. Not to forget the many IST's, Interns, Postgraduates and University Colleagues who supported the project.

"Working on a Dream" _ *Bruce Springsteen*

Green Hydrogen Production Demonstration

_ Dr Shawn Gouws

Green hydrogen is generated by the splitting of water by utilizing an electrolyzer connected through a process that uses renewable energy sources such as wind, solar, or hydropower to power the electrolysis. This process is considered environmentally friendly because it emits no carbon dioxide or other greenhouse gases, unlike other hydrogen production methods that utilize fossil fuels. Green hydrogen is one of the important focal points of global transition energy strategies, especially in processes where decarbonatization processes are difficult to accomplish, such as in heavy industries like steel and cement, and aviation.

At the Nelson Mandela University, a Hydrogen forum was established in 2022 between various departments: Chemistry (Prof Tshentu & Dr Gouws), HRTEM (Prof Jaco Olivier), Physics Photovoltaics (Prof E Van Dyk), eNtsa (Mr. Andrew Young), and Dean of Engineering Prof Sheldon. To strategize and collaborate with Dr Ossie Franks and Prof Swartz to align the Mandela University hydrogen forum with the HySA roadmap for the transition that needs to take place in the Eastern Cape between academics, industry, and the private sector.

Large quantities of industrial hydrogen are produced from fossil fuels, leading to a large carbon footprint that slowly destroys our planet. Therefore, a need arises to reduce the carbon footprint in numerous industrial processes, such as methanation, methanol, and ammonia.

At InnoVenton, a small production unit to produce green hydrogen is currently under construction; this initiative stems from years of electrocatalysis research contributions by MSc and BSc honours students. Funding was awarded from the Technology Innovation Agency (TIA), and seed funding and NRF funding was utilized to purchase the container and electrolyzer infrastructure to build and commission the plant.

Dr Shawn Gouws with his research group; Baxolise Ntsheyiya (BSc Hon), Anele Nzimeni (BSc Hon) and Jason Mackay (MSc).

Dr Shawn Gouws and his group of students are investigating the proton exchange membrane water electrolyzer route to produce green hydrogen for these industrial processes. We are investigating and characterizing several possible catalyst combinations using iridium as a base catalyst for the oxidation evolution reaction that can be used in the membrane electrode assembly of the proton exchange membrane (PEM) water electrolyzer. Although PEM has several advantages, such as high current densities, it pairs well with other renewable energies, such as solar or wind, low gas permeability, and faster hydrogen production with minimum environmental waste. A disadvantage, however, is the capex expense of utilizing PGMs such as iridium and platinum—as well as acid corrosion components.

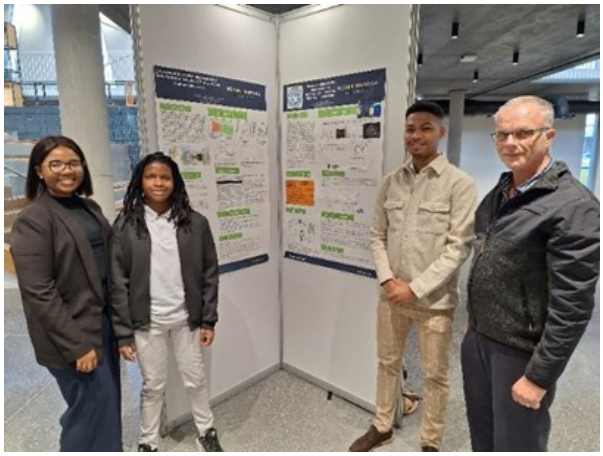


Photo: Nelson Mandela University Research week. The poster presentation session with Baxolise Ntsheyiya (BSc Hon), Anele Nzimeni (BSc Hon), Jason Mackay (MSc) and Dr Shawn Gouws

Output on this research during 2023-2024.

Conference outputs

S Gouws, 75th Annual Meeting of the International Society of Electrochemistry, 18-23 August 2024, Montreal, Canada. Characterization of OER catalysts for green hydrogen production via PEM water electrolytes.

S Gouws, 4th Edition of Chemistry World Conference (Chemistry, 2024) - 17th-19th of June France, Characterization of Ir-based catalysts for PEM electrolyzer**.**

J Mackay, and S Gouws, Virtual international conference on Chemistry and its Applications, Electrochemical characterization of binary metal oxide catalysts to reduce PGM content on proton exchange membrane water electrolyzers, VCCA, Mauritius 7 – 11 August 2023.

National

Mackay, J, Gouws, S and Ferg E. "Synthesis and characterization of electro-catalysts for

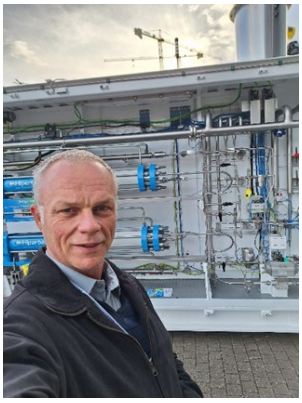
the oxygen evolution reaction to produce green hydrogen via PEM-WE," *34th Annual Catalysis Society of South Africa (CATSA) Conference,* 3rd – 6th November 2024, Champagne Sports Resort, Central Drakensberg.

Mackay, J and Gouws S. "Characterization of OER catalysts for green hydrogen production via PEM water electrolysis" [Poster], *Research week – Advancing the International Decade of Sciences for Sustainable Development*, 9 – 13 September 2024, Nelson Mandela University, Gqeberha (PE), Eastern Cape.

S Gouws, The 6th International Symposium on Electrochemistry, Green Hydrogen Production from PEM Electrolyser: A characterization of Oxidative Evolution Reaction Catalysts, University Johannesburg, 3-6 April 2023.

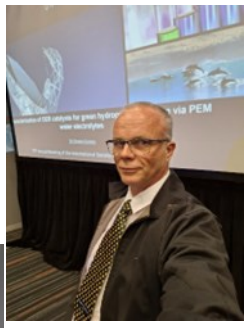
South Africa Chemical Convention 44th, 8-13 Jan 2023 abstract accepted

Abstract No: ABR-2068 Title: Characterization of PEM Electrolyser Oxidative Evolution Reaction Catalysts **Theme:** Industrial **Status of abstract:** Accepted for poster presentation



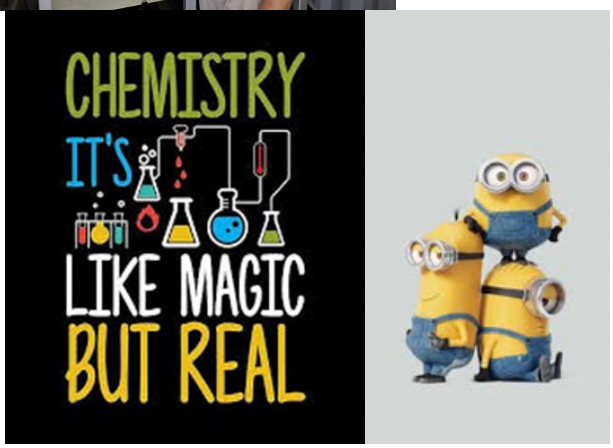
Dr Shawn Gouws, at the European Hydrogen Economy Conference, Balboa, Spain.

Prof Christophe Coutanceau (France, Lyon), Prof Bruno Pollet (Institut de Recherche sur l'Hydrogène, Université du Québec à Trois -Rivièresy, Canada) with Dr Shawn Gouws at an Electrochemistry conference in Canada.



Dr Shawn Gouws in Montreal, Canada at the ISE 75th Annual Meeting of the International Society of Electrochemistry giving his talk titled Characterization of OER catalysts for green hydrogen production via PEM water electrolytes.

Setting up the hardware for the demonstration unit.



InnoVenton partners with the HOPE FACTORY: Cosmetic Formulation Training Collaboration supported by CHIETA

CHIETA -Small Business Support: SMMEs in the Cosmetic Product Market

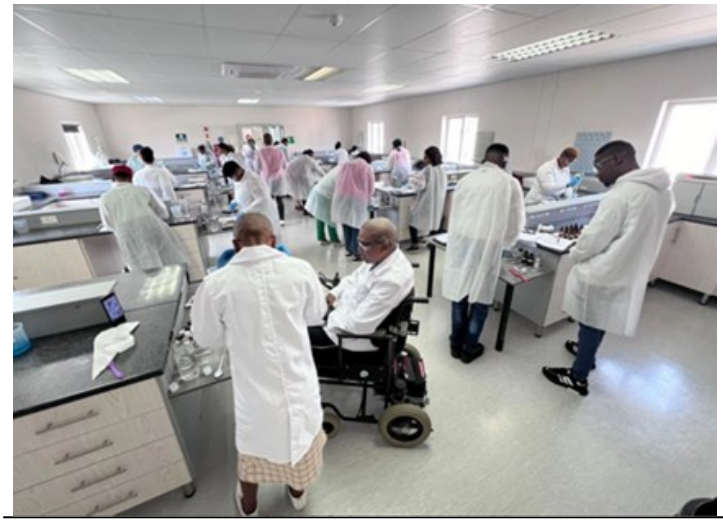
This Skills Development interventions that InnoVenton DCTS in partnership with The Hope Factory, has implemented for 50 start-up businesses, are New Venture Creation Short Skills Programme and CIPC business registration and Cosmetic Formulation Training.

INNOVENTON and their Cosmetic Formulation Training, through their Technology Station at Nelson Mandela University provide the ideal environment to train and support interested entrepreneurs.

THE HOPE FACTORY specialises in customising development projects based on the needs of the client and beneficiaries to ensure optimal impact and growth for the beneficiaries. The Hope Factory has close to 20 years' experience in the design, management, and implementation of entrepreneurial development programmes with a focus on Financial Excellence and Business fundamentals solutions. They aim to deliver impactful Socio-Economic and Skills Development initiatives resulting in mobilising economic activity for Black South African citizens by giving entrepreneurs and start-up businesses the fundamental skills needed to successfully start and operate their own small business.

The Hope Factory will offered two primary interventions namely; The New Venture Creation Short Skills Programme and CIPC, business registration support.

The trainees were provided with skills to prepare them for starting, growing, and sustaining a small cosmetic or personal care product business. The practical formulation workshops took a cradle-to-grave approach, starting with the development of a new idea and the elements that need to be considered in developing a marketing concept.



This was followed by a summary of the development process, a full explanation on the types of claims that can be used to market products to the consumer, paying particular attention to permitted and prohibited claims, and the successful substantiation of the former, in accordance with the requirements of the Advertising Regulatory Board (ARB) of South Africa, including a review of both South African and European Regulations.

The last 3 days of the course was dedicated to practical cosmetic and personal care formulating, which enabled entrepreneurs to do initial product ideation and prototyping.

The support programme will culminate in an Access to Market event, where the delegates will showcase their products.

Photos: Trainees gaining practical experience with formulation development

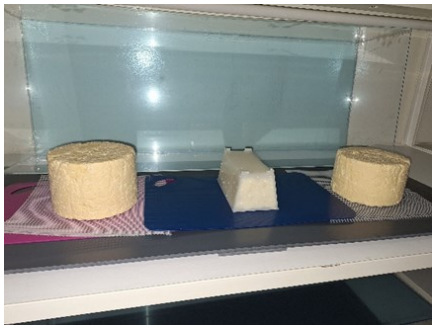
The overall objective of the programme focuses on skills transfer, to give the start-up businesses vital business and financial management skills needed to start and operate a small business. The entrepreneurs will be assisted to register a business with CIPC, as is a requirement by CHIETA. This service will empower the entrepreneur with a legal registered business entity through which they can start operating and selling their manufactured cosmetic products. Successful completion of the short skills programme will result in an accredited certificate for 32 credits.

The best outcome for the entrepreneur will be for them to have a registered business, which is ready to go into the marketplace to trade.

Cheese-making process (CPT 2nd years)

_Dr Shawn Gouws

The second-year Diploma Chemical Process Technology students have manufactured cheese as part of their practical experience module. The process teaches them about teamwork and work ethics, which they learned in year one under the module "Academic and Professional Skills Development." It involves manufacturing three cheeses: cheddar, American Swiss, and blue cheese. The process procedure is as follows: charging the reactor with milk, then warming the milk. This is an important step since the temperature plays a significant role in curing the milk solids and killing bad microorganisms while ensuring the bacteria needed and the rennet addition start agglomerating the milk solids during this process. At this point, the milk mixture must be stirred frequently to ensure all the solids agglomerate. The next step is cutting the cured and waiting for complete separation between the cured and the whey. One student will drain the whey through a cheesecloth, and the cured solids will be salted in a mixing bowl. Another important step is salt kills the potentially harmful bacteria, hardens the cheese to form a protective outside layer, and adds flavour to the cheese. Once the cheese is pressed to remove the excess whey, it is dried and stored for up to six months. Making cheese is a long 8-hour process because of the waiting time, which must occur under temperature control. Students learn about discipline and apply their knowledge of process control.



Overall, the students enjoyed making cheese and applying the knowledge of process control that they had learned in the classroom. To quote one student, "The cheese-making process is a fascinating blend of science involving several key stages that transform milk into cheese."

An Overview of cosmetic product development

Personal Care Product Development

_____Mrs Anneke Greef

At InnoVenton, we have had the privilege of working with a diverse range of clients, from ambitious start-ups including a Miss South Africa Top 10 finalist as well as a local dermatologist to established and well-known local businesses such as the PE Vein Clinic and the Mazoyi Group.

The Mazoyi Group manufactures complementary medicines for children and adults. These medicines aim to assist with colic, phlegm, eczema, wind, and appetite in children and detoxifying in adults. The Mazoyi Mixture is sold in pharmacies and online. It is an aloe-based herbal mixture/remedy. The company would like to expand its product range with the introduction of four new baby skincare products, namely, a moisturiser, a bum cream and a soap bar as well as a liquid body wash.

Photo: Mazoyi Group Baby Products.

The PE Vein Clinic wants to sell an in-house cream to their clients to use post-sclerotherapy. A feasibility study was conducted to firstly ensure the two ingredients can be sourced in South Africa and secondly to obtain the formulation guidelines. We successfully developed and stabilized a specialised cream for the PE Vein Clinic, designed to alleviate bruising and pigmentation following sclerotherapy treatments. (Photos below)

For the Miss SA finalist, we crafted five fun yet effective skincare products targeting “taboo” concerns such as dark spots, ingrown hairs, and the bum area.

These formulations were designed with natural skincare principles in mind, emphasizing sustainably sourced African ingredients and extracts and supported by scientific research. Her skin care brand, Hallè seeks to create fun, effective products that are inspired by Africa and sustainable. The focus is to transform the way people feel about skin by tackling the taboo areas of the skin and celebrating the fluidity of your the skin.

Photos: Hallè Products

The products are broken down into two categories – facial care and body care.

The facial care products are focused on dark marks and any other form of skin discolouration,; including hyperpigmentation, hydrating dry/sensitive skin as well as smoothing skin (evening skin tone). The body care products are focused on smooth skin by means of exfoliation, tightening, brightening, plumping, and nourishing to obtain a natural glowing, hydrated, silky skin.

Among our unique projects was the development of chocolate emulsions formulated from upcycled chocolate waste, designed as a sustainable feed for dairy cows, contributing to a closed-loop production model for local business, Africa Loop.

Premium skincare products were also developed for a sophisticated woman and her dermatologist business partner. These formulations, intended for sale at a Gqeberha dermatology practice and online, embody luxury and efficacy.

Additionally, *Aloe ferox*, an indigenous plant of the Eastern Cape serves as the hero ingredient in a range of baby care products, including a bum cream, lotion, liquid wash, and bar soap.

Individuals and SME's who would like to consult with one of our formulation experts are welcome to bring their ideas, we would be happy to help them make their cosmetic business ideas a reality.

CELEBRATING 2024 ACHIEVEMENTS

Expanding knowledge and expertise: Formulated a sunscreen for a client for the first time.

Client success stories: Received positive feedback from a client and her customers.

Training workshops: Trained 50 delegates in a two-week period.

Supporting SME's: Conducted multiple feasibility studies to support SME's with their cosmetic business ideas.

Industry engagement: Gained valuable insights and connections at the annual COSCHEM conference.

Behind the scenes at L'Oreal Headquarters: Enjoyed an inspiring tour of the L'Oreal Headquarters including their development laboratory.

Celebrating client growth: Saw a former workshop participant thriving with her own skincare range at the Bio-Trade Indaba Day.

LOOKING AHEAD: PLANS FOR 2025

Workshop expansion: Launching a newly developed workshop focused on fragrances and essential oils.

New product developments: Formulating new products including tallow-based skincare, hyperpigmentation products for darker skin tones and a holistic skincare range tailored to the unique needs of dark skin.

Collaboration with CSIR: Partnering with a CSIR PhD student involving nano titanium dioxide.

Ongoing support for SME's: Throughout the year, we will conduct feasibility studies and offer training workshops and short learning programmes, to empower and assist SMEs in achieving their goals.



Introduction to Cosmetic Formulation

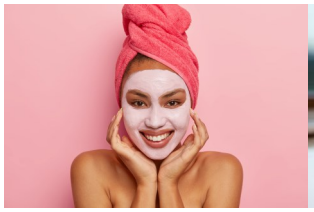
Are you interested in setting up your own natural skin care business, but don't know where to start? Join us for a day to find out. *You don't even need a scientific background!*

The course will cover:

- **Evaluating your formulation idea**
- **Introduction to formulation terminology and the language of formulation**

Who should attend?

Inventors and entrepreneurs who would like to acquire basic tools to better understand and evaluate their idea.




Formulating Creams and Lotions

Do you want to learn to formulate creams and lotions? Come and join us for a one-day practical workshop.

What you'll learn...

- **Basics of emulsion theory**
- **Skin moisturisation mechanisms**
- **Key ingredients in creams and lotions**
- **How to design and formulate your own creams and lotions**
- **Basic formulation practical skills and techniques**
- **Basic product evaluation**

Who will benefit? Aspiring entrepreneurs and formulators. No scientific background or experience needed. The next two courses may also be of interest. (i.e. those related to Fragrances and Surfactants)

Prerequisite: Attendance of **Introduction to Formulating Cosmetics** Short course is recommended .

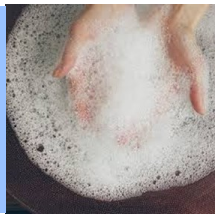
Fragrances & Essential Oils Workshop

Do you want to learn to make your own perfume, essential oil blend and room spray? Come and join us for a one-day practical workshop.

What you will learn:

- **Fragrance basics**
- **Difference between fragrance notes**
- **Fragrance families**
- **IFRA guidelines**
- **How to make an essential oil blend**
- **How to make an eau de parfum**
- **How to make a room spray**
- **Basic fragrance practical skills and techniques**

Prerequisite: Attendance of **Introduction to Formulating Cosmetics** Short course is recommended .

Formulating Surfactants

Do you want to learn to formulate Surfactants? Come and join us for a one-day practical workshop.

What you'll learn...

- **Basics**
- **Surfactant mechanisms**
- **Key ingredients in surfactants**
- **How to design and formulate your own surfactant-based product**
- **Basic formulation practical skills and techniques**
- **Basic product evaluation**

Prerequisite: Attendance of **Introduction to Formulating Cosmetics** Short course is recommended .

InnoVenton

Downstream Chemicals Technology Station

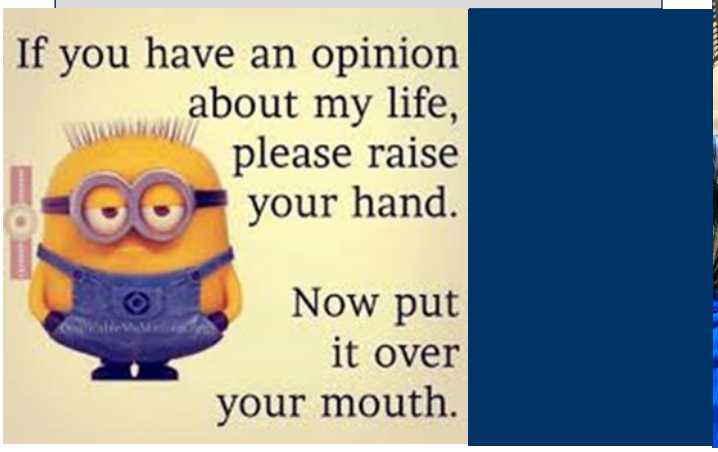
From its inception the Technology Station activities at Inno-Venton have been fully integrated into the larger institute to maximise the impact that we have externally.

InnoVenton/DCTS strives to provide specific technology support and innovation in the areas of:

- Product replacement; extension or formulations
- Improving production/process flexibility;
- Reducing production lead times; Reducing environmental impacts; improving product quality; improving working conditions/safety;
- Providing expert technology, analytical, testing services; and
- Providing custom designed short learning programs for industry
- Kilo-lab, Distillation and Process Plant Facilities
- TIA Seed Funded Projects, Major Projects and Youth development Projects.

Enquiries: Mrs Louise Hamilton T 041 504 3281

E: Louise.Hamilton@mandela.ac.za



What's going on in the Lab ?

_____Miss Olebogeng Mogapi and Miss Siphosethu Schalk

The Analytical Laboratory has been bustling with exciting activities and accomplishments. Here's a glimpse into some of the events and milestones:

Forensic-Like GC-MS Screening Last year we received a sample for GC-MS screening, suspected to contain a narcotic. This felt like a thrilling forensic lab moment for the team! However, the analysis did not detect any narcotics. The major peaks detected revealed 1,7,7-Trimethylbicyclo[2.2.1]heptan-2-one - (Camphor) and Borneol, a terpene and reduction product of camphor. This was a fascinating insight into the chemical composition of the sample and a great learning experience.

Empowering Women in Chromatography As part of ongoing training initiatives, I had the opportunity to train Sethu on troubleshooting and maintenance of the GC instrument, marking another step forward for women in this field. Inspired by my mentor Cecilia Saunders who has exceptional experience in chromatography. Passing on this knowledge feels like a full-circle moment and a step toward encouraging more women in this field.

We successfully performed analysis with two instruments that had not been used for a while and still in good condition, these being:

The Rancimat, used for measuring oxidative stability in biodiesel, provided reliable induction periods. And,

The Miniscan IR Expert, used for determining cetane numbers in biodiesel, delivered excellent results.

Formulation Science **Showcase** 2024

Students pitch innovative scientific formulations to 'Dragon's Den'

_NMU Article 27/11/2024

Toothpaste infused with garlic, horse stable mats made from recycled rubber, a new kind of tablet for tuberculosis, and a water filter that uses hydrogel beads made from seaweed and shells were among the ingenious inventions of Formulation Science Honours students on show this week.

A group of eight students presented these, and other products, at a *Dragons' Den*-type event at InnoVenton, the University's Institute for Chemical Technology, in Summerstrand on Tuesday, 26 November.

STUDENT INNOVATORS: Formulation Science senior lecturer and course coordinator Dr Nicole Vorster, left, and Formulation Science BSc Honours students Anathi Vava, Lebogang Matinketsa, Gemma Gherbavaz, Luyolo Vacu, Carlen Rudolph, Crystal de Kock, Pamella Mbambela and Joshua Kruger

As with the aspiring entrepreneurs in the reality television show, *Dragons' Den*, the students first pitched the product they had invented, and then faced tough questions on commercial viability.

The Department of Chemistry in the Faculty of Science, in association with InnoVenton, showcases the work of BSc Honours students in Formulation Science in this way each year, and can look back on several success stories.

"In this postgraduate course, students learn about formulating consumer products, and they have to develop a unique and innovative product which can potentially be commercialised," said senior lecturer and course coordinator Dr Nicole Vorster.

"They also learn how to write a business plan and how to pitch their ideas to possible investors, e combining science, technology and business in one course."

Focus on student entrepreneurship

As the University has a strong focus on student entrepreneurship and graduate employability, the expo aims to provide the students with a taste of future work possibilities.

The class had to apply theoretical principles of blending raw materials and active ingredients to produce stable, homogeneous and useable products. They also learned entrepreneurial skills to establish SMEs – and the "dragons" grilled the students on areas such as financial projections, target market, distribution channels, unit volumes, costing, turnover and more.

Joshua Kruger used shells and seaweeds for his water filtration

project; Lebogang Matinketsa invented a garlic-infused toothpaste; Gemma Gherbavaz is holding a small piece of the rubber mats she devised for use in stables

Pharmacy graduate **Joshua Kruger**, for example, has developed a water filter that uses hydrogel beads made from ingredients derived from seaweed and the shells of crustaceans.

"The polymer that comes from the crustacean shells has very good absorption, so once water flows through, substances like iron and manganese will stick to the beads and then the clean water will flow through the filter," said Kruger.

The young entrepreneur is now hoping to apply his invention in borehole-water filtration and aims to study further in geology.

Garlic a 'killer' idea for toothpaste

Lebogang Matinketsa dreamt up what sounds like a horrible flavour for dental hygiene: a garlic extract infused toothpaste called Killer.

"I call it 'Killer' because it kills bacteria like there's no tomorrow!" said Matinketsa. By using the correct additives, she promised that it did not stink of garlic but rather had a fresh minty smell.

"The formula harnesses the antibacterial properties of garlic extract, which can help to reduce plaque build-up, and combat bad breath more effectively."

Another student, **Gemma Gherbavaz**, recycled waste rubber using trans-polyoctenamer, a novel polymer, to create rubber mats for horse stables.

Her imaginatively named business, Stable Earth, is now able to turn tyre waste into a functional, eco-friendly solution for horse owners who want their animals to have the benefits of cushioned, easy-to-clean rubber flooring.

"We want to have a positive impact on the planet – and on your stable," said Gherbavaz.

Science meets convenience in new TB tablet

Crystal de Kock developed "science meets convenience" tuberculosis tablets; Luyolo Vacu has used biodegradable ingredients for his face cream

Crystal de Kock has invented a "science meets convenience" tablet for tuberculosis patients who do not have access to potable water. Her Iso-Oraldispers tablets dissolve on the tongue within seconds and do not need to be taken with water.

Luyolo Vacu presented an anti-aging skin-care cream containing biodegradable rhamnolipids, which are strong antioxidants.

Anathi Vava, left, and Pamella Mbambela, each created facial product; Carlen Rudolph has included natural healing ingredients such as honey and rose-hip seed oil in her wound-care patches.

Pamella Mbambela devised a facial serum to gently treat acne with natural ingredients, and Anathi Vava produced an antifungal cream to help treat a skin condition called Tinea Versicolour. The multidisciplinary Formulation Science course draws on various aspects of chemistry, chemical engineering, biochemistry, pharmacy, physics, physiology, statistics and business, and students come from a wide range of qualifications.

Carlen Rudoph, for example, already had completed an MSc in Biochemistry when she enrolled.

Rudolph invented a hydrocolloidal healing product for small wounds and scratches, called the Scratch Patch, made from natural polymers.

The tiny patches offer a moist, protective environment combined with active ingredients renowned for their wound-healing properties, such as honey and rose-hip seed oil.

"In vitro studies, such as antioxidant activity and cell proliferation tests, indicate that the Scratch Patch has the potential to enhance the natural wound-healing process," said Rudolph.

Dr Vorster said the BSc (Honours) Formulation Science degree was developed not only to provide the consumer products industry in South Africa with skilled formulators but also to address the province's high rate of youth unemployment by encouraging entrepreneurship.

Examples of formulated products include personal care products such as cosmetics, as well as household chemical products, pharmaceuticals, processed food products, agrochemicals and many more.

FACING THE DRAGONS: Students (right) explain their products to two of the 'Dragons' Den' panel members

Creative research in service of society

"All of these students are solving societal issues, and they come up with their ideas on their own, we allow them to be creative," said Dr Vorster.

Although further development may be needed for the student projects, she said most of them had shown "proof of concept".

In the past, student projects have included eco-friendly laundry detergent, low-sugar dark chocolate, ice cream with spirulina extract, ant repellent surface cleaner with waste coffee extract, fabric glue, a stain remover pen for clothing, bad breath remedy, tinted sunscreen face powder, a toilet-bowl fizz bomb, face-wash travel tablet and braid remover lotion.

This year's panel of "Dragons" consisted of Dr Vorster with Prof Percy Hlangothi (Chemistry Department), Louise Hamilton (Acting Director of InnoVenton), Anneke Greeff (BSc Hons in Formulation Science graduate, and formulation scientist at InnoVenton), Khanya Ngobo (BSc Hons in Formulation Science graduate) and Dr Adeniyi Ogunlaja (Head of Chemistry Department). Phumela Phungula and Hazel Madikazi of the University's Innovation Office were also present.

Dr Nicole Vorster is the programme's coordinator, for more information feel free to contact her at:

Nicole.Vorster@mandela.ac.za

Mystical Marketing

Rhodes students visit InnoVenton, BSc and 3rd years.

An enthusiastic group of Rhodes students accompanied by Ms Joyce Sewry and Ms Mpondi Molefe spent the day at InnoVenton with some of our project leaders.

The students were shown how microalgae can be used as a renewable resource for environmental sustainability and in health products. How biomass can be used as an alternative energy source. Chemical synthesis and process development can be used to promote health and support agriculture. They were also shown how Formulation Science enables entrepreneurs to start their own businesses and be self sufficient.

InnoVenton hosted Mr Jan Du Plessis (Rhodes BSc) for a week, to shadow our chemists

The 2024 SACI Career and Innovation Day at Rhodes was a great opportunity to spend time with graduates and share what InnoVenton is all about and what we do. Dr Melissa Gouws was invited to share with the delegates the role InnoVenton plays and how we could assist and promote innovation and entrepreneurship amongst graduates. Many had questions about starting their own businesses, taking products to the market and how to handle IP associated with their ideas. Anneke Greef gave an informative presentation about cosmetic formulation to peak the curiosity of future formulators in the audience.

Photo: Rhodes hosts the annual SACI Career and Innovation Day

InnoVenton exhibited the IKS Biotrade Indaba at the Boardwalk Convention Centre in Gqeberha.

Indigenous knowledge systems indaba. Photo below: Dr Ntokozo Dambuza (Nelson Mandela University), Prof. Maryna van de Venter (Nelson Mandela University) and Ms. Louise Hamilton (InnoVenton) gave the keynote address.

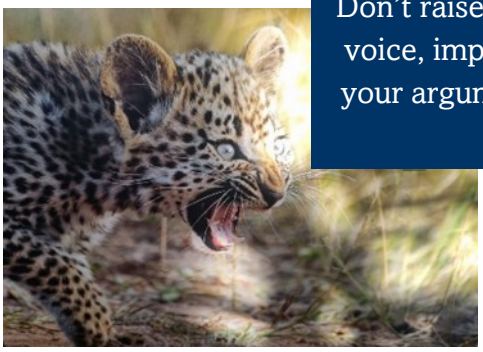
TIA Wastewater Biorefinery Cluster Workshop – Louise Hamilton representing InnoVenton, participated in this along with CSIR, DSI and various other HEI's.

DDG for Socio-Economic Innovation Partnerships from the Department of Science, Technology, and Innovation, Dr Muofhe attended Nelson Mandela University entity presentations.

Dr Nicole Vorster and Chrizé van der Heever and Anneke Greef attended a L'oréal Conference.

While the Guys played Golf….

Charity Golf Day to support Animal Welfare and Cheshire Homes: Michael du Preez, Duncan McFarlane, Jarryd Cuthbertson, Bryn Dugmore. We also supported Cheshire Homes on Casual Day! "WE SEE YOU!"



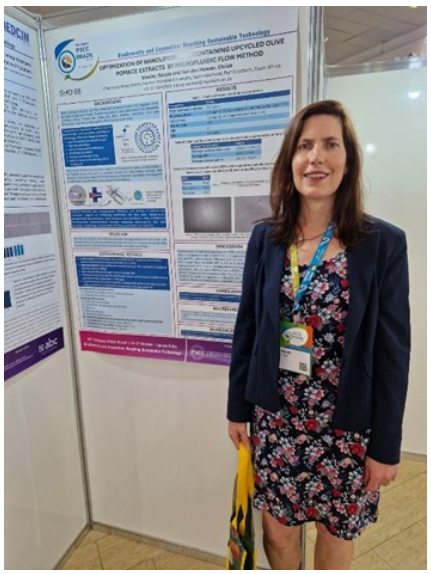
Don't raise your voice, improve your argument.

InnoVenton
Dream. Innovate. Create.

Dr Nicole Vorster and Chrizé van der Heever and Anneke Greef attended a L'oréal Conference.

Dr Awotunde Segan (HOD Biochemistry) from a Uganda University and colleagues, visit InnoVenton.

UCL visits InnoVenton as part of a university wide collaboration.



Nicole in Brazil, poster presentation. Rio. 2024.

Cerebos visit 2024: 2nd years visit Cerebos with Ms Sindokuhle Diko and Ms Mulalo Lusunzi as hosts.

Duncan McFarlane received his Masters in Chemistry at this years summer graduation. He is also the third James Moir Medal recipient along with Dr Gary Dugmore and Mr Jarryd Cuthbertson to have contributed to developing chemical technologies at InnoVenton. Duncan was supervised by Prof Benita Barton, also a James Moir recipient.

SUDOKO

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Do not repeat numbers in any row, column or 3x3 block.

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"So, you want to start your own cosmetic business" __Workshop.

We had the privilege to host an awesome workshop for those budding entrepreneurs who dream of owning their own cosmetic business. Some of the topics covered included: defining the opportunity, the four golden questions, identifying the market for your new product, the product development process, how to find a good manufacturer, developing claims for your product range and lastly the regulatory environment in the South African cosmetic industry.

The workshop equipped the attendees with information that will help them going forward in the future when starting and running their businesses.

Data Analysis Short Learning Programme

InnoVenton hosted a Data Analysis SLP with excel, for analysist, scientists and engineers. This Programme equips participants with the following skills and knowledge:

- How to obtain summaries of a given data set, identify trends and use Z scores,
- How to perform inferential statistical analysis such as calculation of confidence intervals, t-tests, ANOVA,
- How to perform simple and multiple regression analysis on given data and the validation and use of such regression models to define optimum conditions.

This short learning programme placed emphasis on the interpretation of computer output rather than calculations and awards 3 CPD points on completion of the exam.

InnoVenton has corporate membership status as at the South African Institution of Chemical Engineers.

New Equipment Acquisitions

Product Formulation Equipment:

Silverson Industrial Homogenizer - This lab mixer is the industry gold standard for cosmetic product development, and cosmetic product development laboratories all over the world use this specific model to create beautiful gels and emulsions. According to an industry experts, this mixer enhances product stability, which is a very important aspect of the product development process. It has a digital tachometer with an integral programmable timer and an electric rise-and-fall stand, features that none of the other similar models have. Additionally, it includes a data logger program that allows for the monitoring of speed and power draw over time. It can mix from 1 ml up to 20 L and offers excellent reproducibility when scaling up. All these features are essential for product development work and will improve the quality of work output for our clients.

Chemical Process Equipment:

Radleys Carousel 6 station Reactor with hotplate and Cooled Carousel - Experiments for route scouting or optimisation run the risk of having to make comparisons between reactions run on different sets of equipment. The patented Carousel 6 Plus offers parallel chemistry in the most common reaction vessel, the round bottom flask. Heat, stir and reflux multiple samples.

In-Service Training /Intern Project Development

InnoVenton set up an internship training programme focusing on developing and upskilling individuals. The idea is to end up with versatile skilled technicians who have applied knowledge. This should put them in a position where they can contribute and add value to operations at any company they find themselves working at.

The 2024 Interns were placed in areas of Product Improvement and Development, Monitoring and Testing. They are Jonathan Ungerer (Biorefinery), Alindile Vimbelo (Biorefinery), Michael Du Preez (Technical), Siphosethu Schalk (Analytical Chemistry), Miss Vuyolwethu Gulwa (Receptionist).

This year we hosted student consultants who gained experience by working on some of our Chemical Synthesis projects, Duncan McFarlane (Chemical Process), Ulrich Senekal (Chemical Process), Cyprian Moyo (Chemical Process) and Brandon Barnardo (Chemical Process).

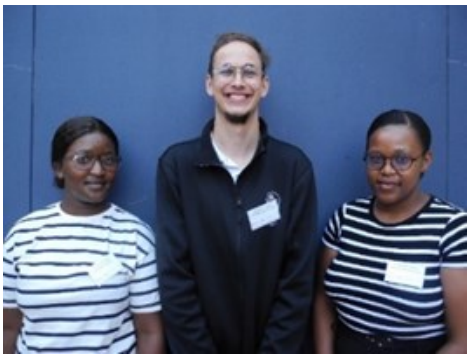
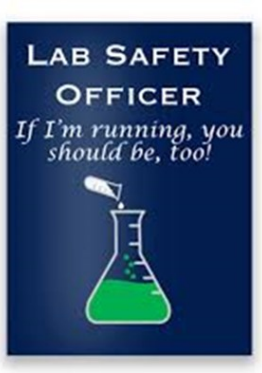


Photo of 2024 Interns: Miss Siphosethu Schalk, Mr Jonathan Ungerer and Miss Vuyolwethu Gulwa

Photo: Chemical Process Technology IST's: Bonga Madikane, Busisa Mdondolo, Snazo Mkhosi, Wananimurena Ramudzuli.

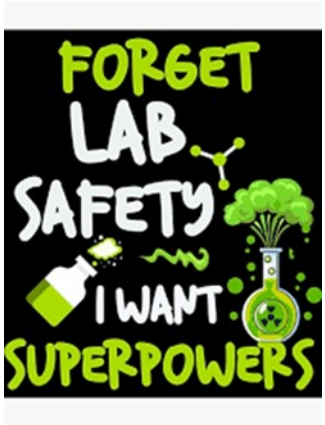
Facilities, Safety, Health & Environment

This year the University has initiated a building maintenance program at InnoVenton, laboratories and offices that suffered serious water damage over the years are being attended to. Thanks goes to Mr Melvin Syce and his team for their intervention. A series of gas lines to the analytical laboratories have been installed and certified by Fransco's Gas services. Aging infrastructure requires upgrading and redundant equipment need to be removed from site or recommissioned at another appropriate site.



Our Chemists are encouraged to manage the chemicals they are responsible for by registering them inhouse and making use of designated storage areas as classified by the hazard associated with the reagent. Ensuring all chemical bottles and containers are properly labelled reduces the risk of misuse and accidents. Chemical storage management is an ongoing challenge, flammable solvents, low hazard reagents and Kilo drums are stored as safely as possible, creating appropriate storage capacity is a goal we are working towards and remains a challenge.

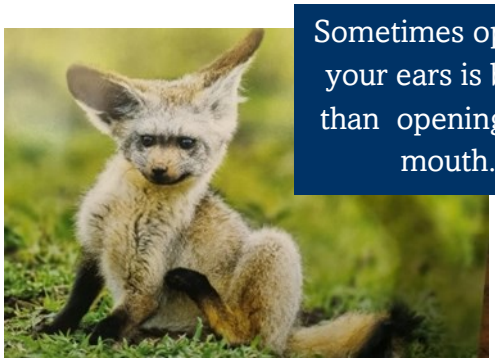
Security and access control have been identified as areas of improvement, Mr Theo Zeelie and his team have been instrumental in assisting us in this regard.



Safety on site is a shared responsibility where everyone can contribute to create awareness and minimise risk associated to hazards. Make sure you practice the safe work procedures developed for your project. Working in a clean, organized space enables productivity and creates a sense of purpose.

Environmental Stewardship remains a value to which we aspire. Responsible waste management practices form part of our institutional culture where "*Reduce, Reuse and Recycle"* are principles on which our waste management is based. Appropriately labelled chemical waste enables responsible disposal and reduces undue damage to the natural environment.

We strive to demonstrate our commitment to continually improve our commitment to Health and Safety at InnoVenton providing a conducive, safe working environment. The Science Faculty SHE committee remains a platform where issues and opportunities are discussed and addressed. InnoVenton encourages staff and students to work towards promoting a safe, healthy working environment.



Sometimes opening your ears is better than opening your mouth.

InnoVenton

Collaborations

Would you and your Team like to collaborate with InnoVenton ?

For more information contact Us...

E: InnoVenton@mandela.ac.za /T: 041 504 3281

Training Offered

In 2024 a range of Learning Programs were offered; we plan to host most of these again in 2025 Updated course dates and rates can be found on our website or social media. Enquiries should be directed to InnoVenton@mandela.ac.za .

- Chemical Process Technology (Formal NMU Diploma)
- Chemical Formulation Science (Formal NMU Honors)
- Basic Chemistry (SLP)
- Basic Chemical Engineering (SLP)
- Process Safety (SLP)
- Data Analysis with Excel for Analysts, Scientists and Engineers (SLP)
- Evaluating your Business Idea Enabling Technology Development Workshop
- An introductory guide to Cosmetic Formulation Workshop
- Creams and Lotions Workshop
- Fragrance Formulation Workshop
- Formulating surfactant-based personal care products
- Introduction to Environmental Management Systems ISO14001
- Hazardous Chemical management in the workplace
- Introduction to Health and Safety Management System ISO45001
- Waste Management in industry
- Medical devices Quality management system, ISO13485
- Scale up: Grams to Kilograms

Looking forward - 2025

2025 promises to be another project packed year. The following are a few of the main activities planned as **InnoVenton Celebrates 20 years of innovation and impact in 2025.**

Product and Process Development Projects: Entrepreneurs in the Chemical manufacturing sector continue to show interest in our pilot scale facility at InnoVenton where they can have test batches produced to qualify their products.

Cosmetic Formulation Improvement: Clients have requested assistance to improve formulations for body lotions and face creams using various specialized key ingredients.

Graduate Internship Program: We look forward to our next intake of Interns and the training lined up for them.

Pilot scale prototype manufacturing facility for emulsions for cosmetic formulations, to bridge the gap between lab scale work and contract manufacturing.

MITC (methyl isothiocyanate) Agri intermediate synthesis. Student consultants; Cyprian Moyo and Duncan McFarlane started with initial background research for this project.

Metam Sodium manufacturing process development. Brendan Bernardo was the student consultant who did the groundwork for this project.

Fluorochemicals; investigate which compounds can be synthesized locally. Upgrading of facilities for chemical synthesis applications.

Workshops in 2025

Fragrances in Personal Care Products

Due to numerous requests from SMEs attending our introductory and formulation workshops, we have started compiling a new Fragrance Workshop. It is currently in the planning phase and will be ready for offering to delegates in Q4.

Surfactants workshop a new SLP for Detergents and Soap Formulations - Industry requested.

G to KG scale up workshop

Data Analysis SLP, 3 CPD points

Introduction to Environmental Management System ISO 14001

Hazardous Chemical management in the workplace

Introduction to Health and Safety Management System ISO 45001

Waste Management in industry.

Medical Devices Quality Management System, ISO 13485.

Process Safety SLP

This course will provide a broad understanding of the tools and problem-solving techniques used in process safety.

The course covers different hazards found in the chemical industry, safe work permits, consequences of toxic vapours, fires and explosions the SHE considerations regarding these consequences, process design and operations, asset integrity, legal aspects, management of change and safety cultures. The format of the presentations will be on MS Teams.

Who would benefit:

- **Anyone involved with a role that does not have direct line responsibility for process safety**
- **Anyone who would like to develop a broad understanding of process safety**

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NELSON MANDELA UNIVERSITY

Looking forward - 2025

Biltong Soup Recipe

_Linda Nortje.

For a truly fantastic comforting soup.

Ingredients:

- 100g Unsalted Butter (3.5oz)
- 1 t Fresh Garlic crushed
- 3 TB Flour
- ½ t Nutmeg
- ½ t Ground Coriander
- ½ t Black Pepper freshly milled
- 1 cup Chicken Stock
- 3 cups Milk (increase milk for a thinner soup)
- ½ cup Fresh Cream (double cream)
- ⅓ cup Blue Cheese
- ½ cup Cheddar Cheese finely grated
- 100 g Biltong finely grated for the powdered kind for sandwiches
- 2 t Sherry
- Thin Biltong Slices to garnish (optional)

Instructions:

Melt the Butter over medium heat in a medium saucepan

Sauté the Garlic in the Butter for 1 minute – sprinkle over the Flour, Nutmeg, Coriander and Black Pepper – stir to form a paste

Add the Stock – stirring continuously to prevent lumps – add the Milk and Fresh Cream, bring to the boil and turn the heat to low

Stir in the Blue Cheese and the Cheddar – stir until melted – remove from heat

Add the Biltong and stir - just before serving, stir in the Sherry

Garnish with Biltong Slices and serve

InnoVenton

Our role is to provide technology support services, skills development training and a technology development capability for basic research and client projects. This includes improving the alignment of basic research and formal teaching with needs.

Knowledge speaks but wisdom listens.

For More About InnoVenton

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