

Newton Fund Newsletter



In This Issue:

- **IAPP:** Spotlight on University of Venda and Walter Sisulu projects
- **Food Security:** An Interview with our Bilateral Research Chair in Food Security
- **20 PhD Exchanges:** University of Limpopo's collaboration with Cardiff University
- **Titanium Development:** Newton Advanced Fellow Prof Chauke's thoughts on collaboration
- **Interview:** NWU Prof Aletta Schutte tells us about her Newton NCD grant
- **Newtonians:** Profiling our Leaders in Innovation fellows and nGap awardees



Department for
Business, Energy
& Industrial Strategy



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Foreword

Welcome to the third instalment of the Newton Fund Newsletter!

In this issue we celebrate the work of historically disadvantaged and under-represented institutions within the UK-SA Newton Fund. Although there remains much room for participation and wider involvement, it is encouraging to see the work already underway and the impact it has had on expanding the reach of research and academics from such institutions.

We will take a look into the various projects and activity, meet two of our amazing Leaders in Innovation fellows, be introduced to one of our Bilateral Research Chairs and see science at work with our non-communicable diseases research project at North-West University.

Tori Bungane, Newton Fund Officer, victoria.bungane@fco.gov.uk



I am delighted to make remarks to this edition of the SA-UK Newton Newsletter. It comes at the back of a very successful service delivery partner workshop which was held in London, where we took stock on the activities of the partnership and recommitted our Department's intent to continued support of the partnership. This newsletter turns the spotlight on the successes and aspirations of the South African and UK research partnership. At the heart of this partnership is the critical ambition to support human capital development. South Africa has in place strategies and policies aimed at supporting human capital development, however, the challenge to address the backlog is stubborn and a huge one in scale. Virtually, all the joint activities priorities this aspect, through student exchanges, research chairs program, fellowships, etc.

Our international partners play such an important role in shaping enduring networks and partnership to address this challenge. It is equally pleasing to see that the work of the partnership is not only centred around well-established universities but also embraces and benefits historical disadvantaged institution (HDI's). This is commendable and very much encouraged. I hope that the focus of this edition will inspire and encourage more institutions and researchers to forge enduring research partnerships under the Newton brand and to also see the value and impact of the SA-UK research partnership.

Director: DST Bilateral Relations, Khaya Sishuba



22 PhD Exchanges: University of Limpopo Pioneering the study of Catalysis with Cardiff University

**A sustainable United Kingdom-South Africa partnership in high performance computing:
How a Newton Fund project is improving our understanding of catalysis**

The UK-SA Newton Fund has funded an exciting PhD partnering project for studying sustainable catalytic solutions by computer modelling, led by Professor Nora H. de Leeuw ([Cardiff University](#)) and Professor Phuti E. Ngoepe ([University of Limpopo](#)). A cohort of PhD exchange students moving between the United Kingdom and South Africa are studying the not fully understood chemistry of catalysts, which are required for many topical industrial processes. The programme is also providing new skills to the visiting students, while creating and strengthening the strategic research links between universities in both countries.

Catalysis is a major industrial sector of the South African economy, particularly in the provision of its energy resources, similarly to the chemical industry in the United Kingdom, which is largely reliant on catalytic processes. In this programme, PhD students are visiting universities in the partner country to gain new computational chemistry skills and employ them to study catalytic process of national importance. The [Centre for High Performance Computing \(CHPC\)](#) in South Africa and the [High Performance Computing Wales \(HPC Wales\)](#) in the United Kingdom have formed a strategic partnership to provide the computational facilities required for this project. In addition to the leading institutions, the participating universities include [University of Cape Town](#), [North-West University](#), [University of the Free State](#), [University College London](#), [University of Southampton](#), [University of Kent](#), and [University of Bath](#).

The development of heterogeneous catalysts previously depended heavily on a trial-and-error approach for preparing and testing new materials for each chemical process. However, recent advances in the implementation and efficiency of computational chemistry codes as well as the power of computer clusters, have made it possible to move considerable research effort away from laboratories.

Amongst the materials and processes studied are doped manganese oxides for application as cathodes in lithium-ion batteries, cobalt oxides as catalysts for the carbon monoxide oxidation in fuel cells, magnetic transition metals as sensors of small inorganic molecules, platinum nanowires as catalysts for the oxygen reduction reaction, zeolites as catalysts for biomass conversion, nitration of cellulose, and polyethylene for medical applications, and platinum as a catalyst for the hybrid sulphur cycle. ***Most of these processes are instrumental in maintaining global health and wealth, but we need to develop innovative technologies and improve the current ones to reduce the environmental impact they have, thereby satisfying the demands of a growing world population and improve our quality of life.***

Several of the PhD students involved are sponsored by industrial partners in their home institutions, which also have strong interests in the processes studied. Industrial sponsors also provide a tremendous contribution to the projects in the form of experimental data to validate results, advice, training and placements, which further enhance the students' experience and impact of the outcomes.

The industrial partners also ensure that the knowledge exchange and exploitation of the research outcomes takes place quickly and seamlessly.

This sustainable PhD partnership programme has been fruitful in the exchange of already more than 15 students, with more than 8 visits scheduled for the remaining lifetime of the project. The students have also benefited from this programme by accessing state-of-the-art research facilities in the UK, such as the [Research Complex at Harwell](#); the [Johnson-Matthey](#) laboratories at Sonning Common and the [University of Reading](#), and attending international conferences in the UK and South Africa, such as the [International Conference of Women in Physics](#) at the [University of Birmingham](#), the [UK Catalysis Conference 2018 \(UKCC\)](#) in [Loughborough University](#) and the [Catalysis for Fuels Faraday Discussion](#) in Cape Town, South Africa.

The ultimate goal of the programme is to create a durable international network of the PhD exchange students and lasting strategic partnerships between the United Kingdom and South African academic institutions, industrial partners and the High Performance Computing centres in both countries.

Social Protection for Food Security: Bilateral Chair ***Stephen Devereux, UWC***

Dr Stephen Devereux is the UK-SA Newton Fund's Bilateral Research Chair in food security, based between the University of the Western Cape (Centre of Excellence in Food Security) and the Institute for Development Studies in the UK, his mandate is focused on social protection for food security. Stephen's background is social policy and social sciences, he is a leader in his discipline and an advocate for food security rights and access. As part of his research chair activities he supervises a number of PhD and masters students and facilitates six month long PhD exchanges between the UK and South Africa.



**Dr. Stephen Devereux, Bilateral
Research Chair**

South Africa has high levels of food insecurity in the lower income demographic, which is a particularly large portion of the nation's population, leading to a child stunting rate of 27% (essentially 1 in 4 children) that Dr. Devereux has found is not decreasing despite the current social grants. With a number of interventions provided by the government which include 12 million children in South Africa receiving the social grants, pensions, disability grants, public works programmes etc, food insecurity and child malnutrition in South Africa still remains incredibly high; Dr. Devereux's overarching research focus is why this is the case and what can be done about it.

To go about his research, Dr. Devereux is examining three social protection tools in particular to examine their real effect on food security, namely the social grant, the public works program and the school feeding programmes. He currently also has two case studies looking at farm workers and informal workers, two research themes which are "rights to food" and "rights to social protection" and also studying the effect of "shame", that is, the shame that is associated with hunger and food insecurity. These are the seven topics that Dr. Devereux will be interrogating throughout his five year research chair.

In 2016, Dr. Devereux focused on studying South Africa's School Feeding Programme, he found that although the programme is extensive; feeding 9 million children daily, there is little known about it with were no evaluation mechanisms in place to scrutinise the programme. Dr. Devereux launched a "School Feeding Working Group" at the Centre of Excellence that looked at every aspect of the programme (school gardens, food procurement, food safety etc) through several seminars, this culminated to the first workshop event on School Feeding in South Africa, attended by Department of Basic Education, Policymakers, NGOs, Academics and the Private Sector. The event received significant media coverage and subsequently led to the devising of the National School Nutrition Policy Forum that will seek to inform the government on school feeding policy and lobby for breakfast to be included the school meals.

"I'm an academic but I don't believe in writing journal articles that will go to libraries and nobody reads them, I believe it's all about influencing policy and making a difference" Dr. Stephen Devereux

Industry Academia Partnership Programme: University of Venda and Walter Sisulu University

The UK-SA Newton Fund are proud to announce new awardees in our IAPP initiative, three of which are from Historically Disadvantaged Institutions!

About IAPP:

Under its remit as a delivery partner of the Newton Fund, the Royal Academy of Engineering has partnered with the Department for Higher Education and Training to enhance engineering teaching, research and innovation outcomes in South African universities through building bilateral industry-academia linkages. This programme also aims to foster greater ties between engineering research and innovation stakeholders in both countries.

The Projects:

Lead University	Project Name	Brief Description
Walter Sisulu University (WSU)	<i>Enhancing staff capacity towards knowledge exchange in engineering education and practice project</i>	The project focuses on staff and curriculum development with a view to improve communication skills of engineering graduates; staff capacity development for the world of work; application of project and problem-based learning as a teaching and learning Strategy; development of staff capacity to undertake postgraduate supervision; and research on Curriculum mapping as a tool for curriculum analysis.
University of Venda (With: the CSIR and Bath University)	<i>Infrastructure for Water Resilience in Urban Areas</i>	The project is aimed at developing new modules on urban infrastructure and water resilience in urban areas for implementation in South Africa. This curriculum development is in support and promotion of an existing Bachelor of Construction Engineering programme at advanced stages of approval at the University of Venda. The module will also be used in curriculum review to strengthen the existing Urban and Regional Planning Programme (at both the undergraduate (existing) and Master Programme under development.
Walter Sisulu University (With: Tshwane University of Technology; University of Johannesburg, The Welding Institute (TWI) and University of Leicester)	<i>Teaching Methods and Research into Advanced Welding Technology for Improved Manufacturing in South Africa and the UK</i>	The project proposal aims to achieve the following: The development and improvement of manufacturing methods, focused on advanced welding, with particular emphasis on the emerging needs of the SA economy. One of the welding techniques for particular study will be friction stir welding as well as any other promising and suitable welding technologies. Teaching and dissemination of these advanced welding methods to a wider audience in both SA and the UK consisting of staff and students in academia and also to industry. Building sustainable and long-lasting links between UJ, TUT and WSU in SA and the UoL in the UK for the advancement of engineering teaching and research and the application of advanced engineering methods, particularly with regard to welding.

On International Collaboration: An Advanced Fellow's Experience

Professor Hasani Chauke (Deputy Director), holds a PhD in Physics from the University of Limpopo, and was awarded the Royal Society-Newton Advanced Fellowship; his area of specialisation is in mineral processing and metal alloys development using computational simulation techniques.

We received the Newton Fund for 2015 -2018, a three year term partnering with Professor CRA Catlow at the host institution - University College London. Professor Richard Catlow (FRS) is an Honorary Professor in the Materials Modelling Centre (MMC) since 2013, before then he worked closely with the University of Limpopo for over two decades. He has recently been appointed the next Foreign Secretary of the Royal Society (London). The Newton Advanced Fellowship, provided an opportunity for personal development and career growth through research collaboration, international conferences and great platforms to showcase research and learn variety of techniques applied in the computational field.

The project is titled “Computational modelling of titanium development” and focused on the growth and evolution of titanium clusters and simulating the reaction processes which are involved during the titanium production at CSIR’s pilot plant. This involved CSIR participation with Mr Dawie van Vuuren, then head of the Titanium Pilot Plant. The computational approaches and techniques were conducted at both UL and UCL, which includes first-principle density functional theory and semi-empirical molecular dynamics code, both commercial and self-developed codes. The access to computational resources at UCL was an added advantage to the research project. Both students and researchers involved the titanium project were able to access and utilise the computational codes during and after the visit at UCL.



From left: Mr Dawie van Vuuren, Prof HR Chauke, Prof CRA Catlow and Prof PE Ngoepe

Workshop: Characterisation of Metal Particles, October 2016



CSIR, UCT, NWU, TUT and JMTC. We are anticipating a follow-up workshop in February 2019, in Polokwane.

During this period, a number of activities took place and one not to be forgotten is the hosting of a two day workshop under the theme “Characterisation of Metal Particles”, in Makgoba Skloof, Limpopo; with Prof Chauke, Prof Ngoepe and Prof Catlow as hosts. Most of the contributed presentations focused on the nanoparticles, catalysis and titanium-based related topics. The workshop attracted both local and international speakers from universities and industries i.e. UCL, Cardiff, Southampton, Birmingham and locally was

The grant afforded us an opportunity to have postgraduate student exchanges between UL and UCL, at least three students (one MSc and two PhD) visited UCL for a duration of three months at most

each to learn and train on new computational codes and techniques. With this arrangement, we were able to complete an MSc research work in one year and upgrade to a PhD, whose work was published in the **Physical Chemistry Chemical Physics (PCCP)** journal. We have also hosted post-graduate and post-doctoral fellows from UCL, who also gave lectures on coding and methodology related to the research at MMC; these visits were fruitful and beneficial to our group. We continue to use the code developed at UCL and access to the research computational platforms, as part of the collaboration through the Newton Fund. Other achievements include three international conference presentations (China, USA, Germany) and about six locally; and we produced three conference proceedings.

The success of the collaboration also relied on the smooth administration of running costs by the host institution (UCL), and credit should be given to the finance division and Professor Caltow for his vast understanding on handling a collaboration of this nature. From this experience, I would certainly encourage more collaboration through the Newton Advanced Fellowship for South African Universities with the United Kingdom Universities. This will allow the sharing of skills and advancement of research amongst students in particular those coming from disadvantaged communities. I found this as a great opportunity for individual and research groups in SA, students will gain exposure, training and encouragement to pursue higher qualifications at MSc and PhD research projects. At the MMC, we have seen the fruit of the Newton Funds and we would like to expand our based and establish future collaborations in other areas of our research niche.



Teleconference: Discussions were usually held through teleconference with a research team at UCL and UL. **Left:** Dr Scott Woodley, Mr Tshегоfatso Phaahla, Prof Richard Catlow, Dr Tomas Lazauskas and Alexey Sokol. **Bottom right:** Prof Phuti Ngoepe and Prof Hasani Chauke; **Top right:** Dr Matthew Farrow

Meet a Newtonian: Leaders in Innovation Fellows and nGap

The UK-SA Newton Fund has a substantial representation of the Leaders in Innovation Fellowship (LIF) Fellows at North-West University. The LIF programme takes an annual cohort of 15 innovators to the UK for two weeks of rigorous training to develop their innovations and help create a plan for commercialisation, the Fellows are then matched with a mentor who assists with their development for 6 months. Below are some Northwest LIF graduates and their experiences:

- **Ketlareng Polori**



“I am passionate about innovation, intellectual property and contributing to society through mentorship and entrepreneurship. Through the LIF programme, I have learned about the power of networking and using the business model canvas as a new way of getting an efficient and effective business plan. The LIF programme is a very compact and intense for innovators and entrepreneurs to market and expose their technologies on a big platform outside their country homes. I am truly grateful for the opportunity to attend the programme. I would do it again

given another chance, a life change programme.”

About the Innovation: Food Life Extender is an antimicrobial thin-film with various applications. The food coating hydro-gel, extends the shelf life of fresh produce. The edible coating allows for a slower release of oxygen, delaying the ageing process, and spoilage caused by microorganisms developing in fruit is prevented by its antimicrobial activity.

Impacts: Reduced costs in transport, reduced costs in cold chain, reduced food spoilage. Global food spoilage is 1.3 billion tons, that's x6 as food produced in sub-Saharan Africa (United Nations Environmental Program). Reduced wasted labour. Reduced malnutrition and starvation. Reduced waste in water, electricity and reduce waste at landfills

- **Frederick Bezuidenhout**

“The LIF was a life enriching experience. Spending time in the UK and learning from the best mentors industry has to offer truly broadened my thinking. It equipped me with much needed experience and networks to take the projects I work on further. “



About the Innovation: 1. A quantum bit generator, generating random numbers through using hardware and software random number generation algorithms. This could be used in data security/software encryption, gaming and simulation. This technology is patent protected worldwide.

2. Greenhouse/agriculture film which manipulates the sunlight to increase crop quality, increase crop growth and delivers improved yields. The film further reduces plant stress in warm dry areas. This invention is also patented internationally and in its final testing phase. I can share photos with you.

Impact: I am looking forward to successfully commercialize the above mentioned innovations and in doing so create a success story that can motivate and stimulate the thinking of my fellow South African citizens. I would like to harness my talents to improve the conditions of our country through alleviating poverty and unemployment, this can only be done through entrepreneurship and innovative thinking. In order to achieve the above we need to create success stories. What is needed the most to success I would say is networks, of fellow entrepreneurs sharing my passion to drive positive change. Then funding and all other required aspects will follow naturally.

The UK-SA Newton Fund has a current cohort of 17 New Generation of Academics Programme (nGAP) academics that are being supported to spend time in the UK to gain international experience in their discipline, build networks and strengthen their research. An increasing number of nGAPs are from historically disadvantaged and under-represented institutions, below are two profiles of the current UK-SA Newton exchange cohort from such institutions.

- **Welcome Dlamini: University of Zululand**

Welcome Dlamini is a lecturer at the University of Zululand in the discipline of Information systems and Technology, Statistics and Applied Mathematics. Part of the nGAP requirement is that he completes his Ph.D. in 3 years, publish articles and also supervise the postgraduate student. From his research travel to the United Kingdom, he expects to gain more understanding on spatial modelling, Machine learning, including Bayesian survival approaches. Most importantly, Welcome aims to complete an article and investigate possible future collaboration.



Welcome Dlamini will be going to the University of Southampton

- **Moreoagae Randa: Sefako Makgatho University**



Moreoagae Bertha Randa has completed the Master's Degree of Public Health from University of Limpopo (Medunsa Campus). She is currently studying towards her PhD at Sefako Makgatho Health Science University. She is a lecturer for Primary Emergency Care for Medical and general campus students, and final undergraduate B Cur/Bachelor of Nursing students in General Nursing Science and Art. Moreoagae has presented at national and international conferences and conducted independent research. She has published abstracts in reputed journals and written chapters in books. She is also a Demonstrator for Video Productions of Training Nursing Skills produced by Homebrew Productions and Commissioned

by Juta Academic Publishers.

Moreoagae will be going to Nottingham University.

Q&A: Non-communicable Diseases Researcher Prof Aletta Schutte at NWU

Please introduce yourself?

My name is Alta Schutte, I am a research professor in cardiovascular physiology. I am the NRF/DST SARCHI Research Chair on the early detection and prevention of cardiovascular disease in South Africa. I am also the Director of the SAMRC Extra Mural Unit on Hypertension and Cardiovascular Disease, hosted by the Hypertension in Africa Research Team (HART) at the North-West University.



What is Africa-PREDICT?



The African-PREDICT study, which stands for the African Prospective study on the Early Detection and Identification of Cardiovascular Disease and Hypertension, was designed to track and monitor young healthy South Africans (aged 20-30 years) for at least 10 years. This approach will allow us the opportunity to better understand the early phases of cardiovascular disease development. We carefully measure health behaviours (e.g. salt intake, diet, physical activity, obesity, smoking, alcohol) and monitor these individuals for a detailed range of biological biomarkers. We further perform

an array of cardiovascular assessments, such as 24-hour blood pressure, central pressure, echocardiography, carotid wall thickness, arterial stiffness and the retinal microcirculation. By integrating this information in a unique black and white cohort, we will be able to suggest better cardiovascular disease preventive strategies that may be implemented on a population-level.

How is the Newton Fund supporting your work?

The Newton Fund not only supports us to ensure the first 5-year follow-up of this valuable cohort, but also allows us to measure a detailed urinary proteomic profile, in collaboration with our UK co-investigators in Glasgow (Prof. Christian Delles). Furthermore our biomarker profile is supported by the Newton Fund to also assess 21 inflammatory cytokines using multiplexing. This is due to evidence indicating that early low-grade inflammation may play an essential role in hypertension development. Lastly we are able to monitor with the Renin Angiotensin System (RAS) Fingerprint, which includes 10 peptides, how this central blood pressure control system changes over time as blood pressure increases with age in the black and white groups - known to exhibit different RAS profiles.

What would be the best outcome/impact of your work?

As this is a prospective study, the best outcome would for us to pin-point specific predictors for blood pressure elevation and target organ damage in young healthy people. By doing so we can start testing the implementation of very specific prevention programmes.

How is international collaboration helping your research?

The African-PREDICT study benefits significantly from international collaborator insights and expertise. With regards to the Newton Funded aspects, the expertise of Professor Delles, which is a renowned expert in urinary proteomics in the development of cardiovascular disease, is invaluable. Not only does his laboratory perform these detailed analyses, but our unit also benefits as scientists have travelled to Glasgow to also learn these techniques. We are therefore expanding our expertise and capacity to analyse and publish these results independently in the future.

What is your advice to upcoming researchers, particularly those from HDIs and smaller universities?

It does not matter at which institution you are based. Although mentorship can make a marked difference, it is rather your ability to network with experts that will set you apart. To do this you need to travel to the most relevant meetings, and make sure your research is on a very high standard. This will automatically create interest from other experts.

Prof Schutte is the recipient of one 5 larger scale research grants for Non-communicable diseases under the UK-SA Newton Fund.

Current Open Calls:

Researcher Links Travel Grant

NRF/British Council- Researcher Links Travel Grants provide financial support for early-career researchers to undertake an international research placement to strengthen links for future collaboration, build research capacity in developing economies, and enhance the researcher's career opportunities. **Closes 11 June 2018**

Visit www.newtonfund.ac.uk/funding/fundingopportunities to view and apply for these calls

Upcoming Events:

- SASIE Social Entrepreneurship Colloquium: 30 July – 1 August 2018, Pretoria

About the UK-SA Newton Fund

The **UK-South Africa Newton Fund** is a major part of the UK's global Newton Fund. Since its launch in 2014, there has been over £30m invested by both countries. UK and South Africa have agreed to extend the duration of the partnership for a further 4 years to 2021.

- **During the its first three years, the UK-SA Newton Fund successes have included:**
 - 25 research programmes (from TB, non-communicable diseases to social science for development, including urban transformations)
 - Supported 3 Bilateral Research Chairs
 - 42 Fellowships and over 100 mobility grants
 - international PhD partnership programme involving 288 students
 - Taken 45 participants through the Royal Academy of Engineering's Leaders in Innovation Fellowship programme.
 - STEM skills and training through the Development in Africa through Radio Astronomy (DARA) programme
 - A Women in Science communications training programme
 - Established the Weather and Climate Science for Service Partnership South Africa – a partnership between the Met Office and South African Weather Service