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Global initiative enables young female African researchers to excel in science

Timed to coincide with UN International Day of Women and Girls in Science on 11 February, and to inspire more female students to study and work in science, the Global Challenges Research Fund Synchrotron Techniques for African Research and Technology ([GCRF START](#)) grant has announced the results of its three-year project launched in March 2019.

To date, it has directly collaborated with many young African research students, including two University of Cape Town (UCT) researchers, and given access to almost 100 synchrotron beamline sessions. Over half of START's students are female scientists who are demonstrably changing perceptions and increasing the possibilities for women choosing long term STEM research careers.

Professor Edward D Sturrock from UCT said: "The GCRF START grant has been a game-changer for young African scientists, particularly from under-represented groups such as female, and black scientists, enabling them to enter the fields of Structural Biology and Energy Materials and thrive."

"Globally UNESCO figures show that only 30% of researchers are female and they occupy only 20% of STEM leadership positions. These figures are even lower in many countries in Africa underlining how important it is to challenge women's under-representation. Young female African scientists are vital both for their research and as role models and mentors for the next generation.

Professor Chris Nicklin, Science Group Leader and Principal Investigator (PI) in the GCRF START grant programme, echoed similar sentiments. "So we are really delighted to see many of the young women we collaborate with through the START grant, making great strides and achieving some incredible results in the fields of structural biology and energy materials," he said.

GCRF START is an innovative collaboration between Diamond Light Source, the UK's national synchrotron, and higher education and research partners in the UK and Africa. It is funded by the Science and Technology Facilities Council under the UK government Global Challenge Research Fund programme. It is enabling and inspiring researchers from this, and the next generation of Africans to choose careers in science and find African and joint UK-

African solutions to some of the world's most pressing health and environmental challenges.

A key goal is to challenge the under-representation of women in science by providing access to world-class scientific facilities, funding, training, mentoring, and unique international collaborations. Great results have been achieved in a relatively short space of time because START scientists get access to specialist technologies and facilities not available on the African continent - like beamtime on the Diamond synchrotron.

One indicator of the success of the programme is how the tiny community of structural biologists in Africa has grown across South Africa including a whole new generation of women. Similarly, in energy materials, the gender factor has traditionally been a barrier, so having young women entering materials science is great progress. Additionally, all these women participate in outreach and act as role models to inspire girls to choose STEM careers.

The UCT-affiliated female START successes include:

Dr Lizelle Lubbe – A GCRF START grant-funded postdoctoral research fellow in structural biology at UCT and one of only a handful of scientists in Africa trained in single particle cryo-EM – a cutting-edge technique for determining the structure of proteins.

Many countries in Africa experience the highest prevalence of hypertension in the world at 27% (World Health Organization, 2019) causing conditions such as stroke, heart failure, heart attack, kidney failure and loss of vision. Lubbe is researching ACE (angiotensin converting enzyme) inhibitors which play an important role in blood pressure regulation, but unfortunately can have serious side effects in some patients. Her goal is to improve the lives of patients living with hypertension and other diseases associated with ACE by increasing our understanding of the disease-causing protein, leading ultimately to the design of ACE inhibitors with less side-effects.

Lubbe shared: "My research on a blood pressure regulating enzyme has greatly benefitted from the training my colleagues and I have received, as well as the use of the high-end microscope at Diamond facilitated by the START grant. The outcome of our research will greatly enable us to design better drugs for the treatment of hypertension, a major risk factor for stroke and heart disease and the kidneys. These are global challenges which not only affect developing countries but also the developed world.

"The GCRF START grant will not only build critical structural biology skills in Africa but in time can uplift communities by making science accessible through various outreach programmes. I find this very humbling – the fact that we are able to use science not only to address interesting questions in the world but also to directly impact lives and make them better."

Melissa Marx – With the help of the START grant, UCT master of science student Marx, is learning how new research techniques contribute to the development of inhibitors for the human papillomavirus (HPV) infection, thereby decreasing HPV-associated cancer incidence down the line. HPV is the second most frequent cause of cancer among women in Africa and South Africa.

Marx said: "I think we, as African scientists, have a lot to offer. We are very connected and very close to the problems of the world. On a daily basis, we witness many of the global

challenges first-hand and see the impact of diseases like HIV/AIDS, TB, malaria, cancers and other communicable, as well as non-communicable diseases. We can see directly how our research can be life-saving. This is a big motivator!”

Dr Priscilla Masamba – A postdoctoral researcher in South Africa who has solved the partial structure of a protein from *Schistosoma mansoni*, a parasite responsible for the debilitating disease Schistosomiasis (Bilharzia) which is endemic in more than 78 countries, with an estimated 4 million people infected in South Africa alone. Her work will contribute to drug discovery efforts and is notable because she was the first student from the University of Zululand (Unizulu) to use the Diamond synchrotron, which she did remotely from a lab in South Africa learning many scientific techniques for the first time.

Masamba achieved her PhD from Unizulu in 2020 after which she secured a bursary for a postdoctoral position at the University of Johannesburg. As a PhD candidate, Masamba was the first Unizulu student to use the UK’s national synchrotron, Diamond Light Source, made possible by the GCRF START grant, enabling her in 2020 to solve the partial structure of the G4LZ13 universal stress protein - a potential target for novel Schistosomiasis medicines. The unique collaboration between structural biologists at UCT and Unizulu introduced by START Co-I, Professor Trevor Sewell of UCT, made possible through the GCRF START grant, provided Priscilla with sought after skills and the rare opportunity for access to Diamond for her experiments using state-of-the-art robotic technology at Diamond controlled remotely from a laboratory at UCT.



From left: Dr Lizelle Lubbe, Andani Mulelu and Melissa Marx.

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Dr Priscilla Masamba in the laboratory at UCT where she conducts her experiments.
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