



Building Human Capital for the Development of Nanotechnology in South Africa

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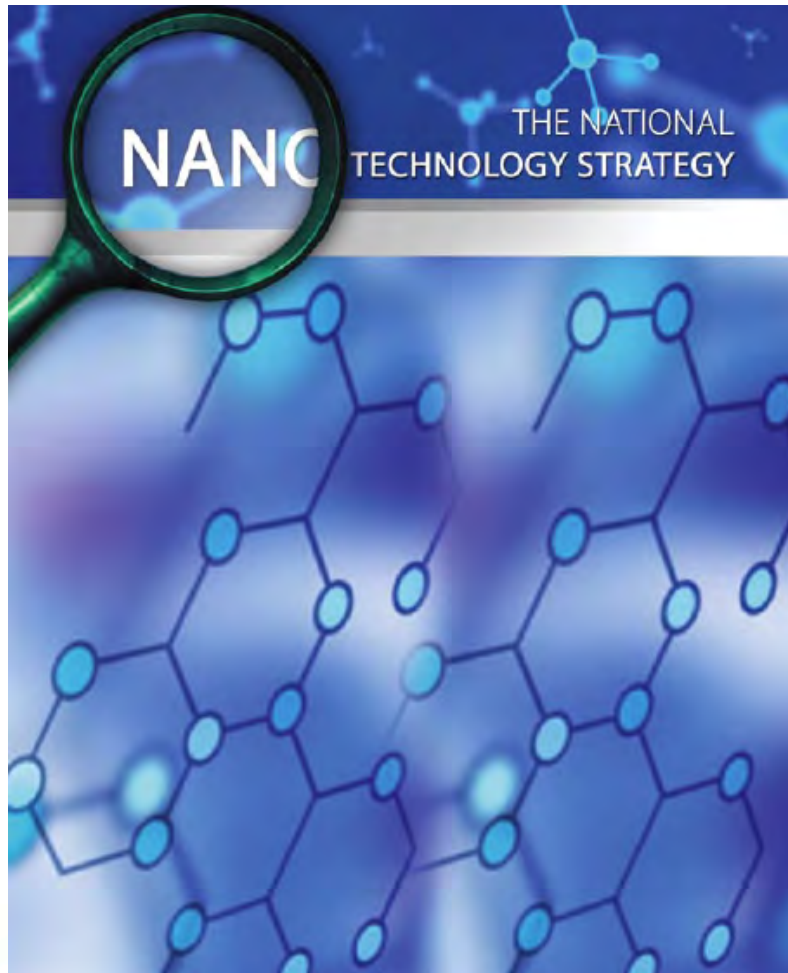
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Introduction

- Nanotechnology is the act of manipulating materials at very tiny scales – at the level of atoms and molecules. With materials under 100 nanometres, the ‘normal’ rules of physics and chemistry no longer apply and many materials start to display unique and, sometimes, surprising properties. They may become much stronger, more conductive or more reactive.
- The multidisciplinary nature of nanotechnology allows for its application in wider range of fields such as energy, water purification, health (drug-delivery systems) and advanced materials.
- According to Lux Research, the revenue from nanotechnology-enabled products worldwide as of 2014 stood at USD1.6 trillion – a growth of 90% in 2 years from USD850 billion in 2012 (Makhoba X, Pouris A, 2016).
- The potential risks of ignoring investments in nanotechnology may be huge for South Africa. It is for this reason that research and development in nanotechnology in South Africa is being coordinated at a National level by Department of Science and Technology (DST).

Policies Driving Nanotechnology Development in South Africa



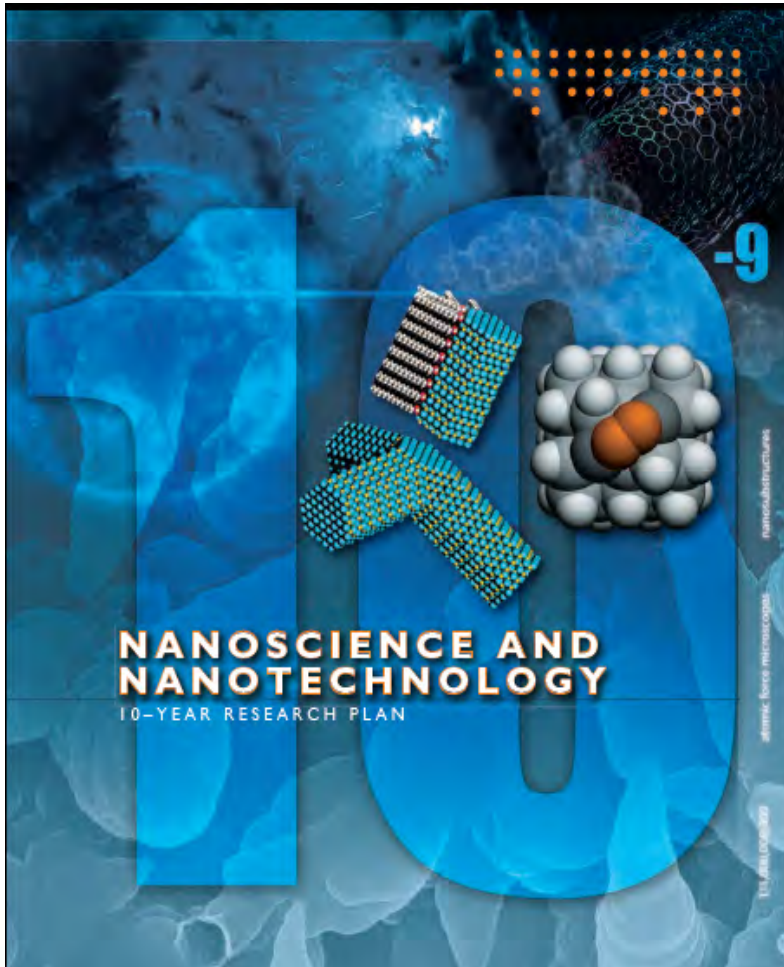
National Nanotechnology Strategy (NNS)

- Launched in April 2006 by the DST
- Key focus areas of the strategy:
 1. Water
 2. Energy
 3. Health
 4. Mining and Minerals
 5. Chemicals and Bio-processing
 6. Advanced Materials & Manufacturing

Vision of the Strategy

“draw upon existing strengths of the national system of innovation while addressing the need to enhance its research infrastructure and to **create a workforce** for advancing technology businesses that support the country’s future competitiveness and enhanced quality of life”.

Policies Driving Nanotechnology Development in South Africa



10-Year Nanoscience and Nanotech Research Plan

Sets out a detailed implementation plan of National Nanotechnology Strategy and identify the need for critical programmes.

This plan is a key component of the implementation of the National Nanotechnology Strategy.

Pillars to Implementing the Strategy

- Innovation
- Knowledge Generation
- Infrastructure Acquisition
- Responsible Development
- **Human Capital Development**

Human Capital Development – SA Research Chairs Initiative (SARChI)

Background

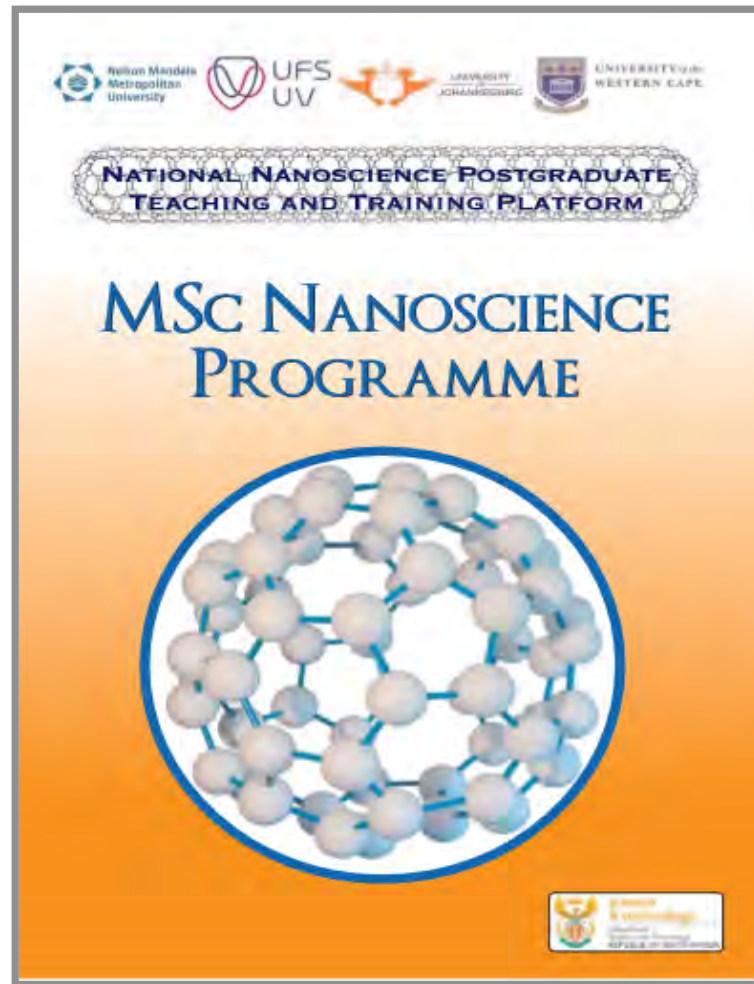
- SARChI's were established by the DST in 2005/06 FY and are a strategic response to address the challenge of developing high-level research skills for the National System of Innovation.
- The main goal of this initiative is to strengthen and improve research capacity and leadership at universities for producing high-quality postgraduate students and advancing research.
- SARChI's dedicate at least 95% of their time conducting research, supervising an average of 10 masters and doctoral students per annum and mentoring emerging researchers.
- From 2006/07 to 2016/17, research grants of R1 866 675 418 (approx. R1,8 billion) has been disbursed to 197 SARChI chairs while supporting of 1651 supported between 2007/08 to '16/17.

Human Capital Development – SA Research Chairs Initiative (SARChI)

List of Nanotechnology Research Chairs					
Name of Chair Holder	Name of Research Chair	Host Institution	Race	Gender	Tier
Professor J.R. Botha	Nanophotonics	NMU	White	Male	2
Professor V.K. Gupta	Nanotechnology	UJ	Indian	Male	1
Professor E.I. Iwuoha	Nano-Electrochemistry and Sensor Technology	UWC	Black	Male	1
Professor P. Kooyman	Nano-Materials for Catalysis	UCT	White	Female	1
Professor T. Nyokong	Medicinal Chemistry & Nanotechnology	RU	Black	Female	1
Professor N. Revaprasadu	Nanotechnology	UZ	Indian	Male	1

- Tier 1 - for established researchers that are recognised internationally as a leader in their field and/or have received substantial international recognition for their research contributions.
- Tier 2 - for established researchers, generally under the age of 40 (forty) years with a strong research, innovation and human capital development output trajectory, and the potential to achieve substantial international recognition for their research contributions in the next five to ten years

Human Capital Development – SA Research Chairs Initiative (SARChI)



Human Capital Development – Masters in Nanoscience Programme

Background

- The programme began in 2012 and is an initiative funded by the DST and implemented by a consortium of four of the country's universities – University of the Western Cape, University of Johannesburg, Nelson Mandela University and the University of Free State.
- Students from the biological, chemical and physical sciences all register for the same degree - a new concept in advanced research in South Africa.
- The coursework component (9 months) is completed at the University of the Western Cape and students continue their research projects (15 months, minimum) at their home university.
- The admission criteria requires a student to hold a BSc Honors or Btech or equivalent and an average of 60% or above. The full scholarship is provided and includes: registration, tuition and accommodation costs. Also included is an annual stipend (personal costs) and allowance for purchasing books and a laptop.

Human Capital Development – SA Research Chairs Initiative (SARChI)

MODULES

Core Modules

- Central Concepts in Nanoscience
- Management for Nanoscientists

Nanochemistry Group

- Foundations of Nanophysics for non-physicists
- Foundations of Nanobiomedical Science for non-biologists
- Advanced Nanochemistry
- Experimental Techniques in Nanochemistry

Nanobiomedical Science Group

- Foundations of Nanophysics for non-physicists
- Foundations of Nanochemistry for non-chemists
- Advanced Nanobiomedical Science
- Experimental techniques in Nanobiomedical science



Nanophysics Group

- Foundations of Nanobiomedical Science for non-biologists
- Foundations of Nanochemistry for non-chemists
- Advanced Nanophysics
- Experimental Techniques in Nanophysics

For further information please contact the Administrative Hub at:

Email: nanoscience@uwc.co.za

Tel: (021) 959 2063

DETAILS OF THE AWARD

A full scholarship is provided, which includes all registration, tuition and accommodation costs. An annual stipend to assist with personal costs is also provided, as well as an allowance to cover the purchase of books and a laptop.

ADMISSION CRITERIA

South African citizens with a BSc (Hons), B.Tech or equivalent degree and an average of 60% and above are welcome to apply.



Human Capital Development – Masters in Nanoscience Programme

Statistics | Outputs | Achievements

- From 2012 to 2016, a total of 135 students have been admitted to the programme – 58 male and 77 female. In terms of demographics, 75% are blacks; 21% are coloured and 2% are white students.
- From 2012 until end of 2017, 113 students have graduated from the programme; with further 21 students to graduate in March/April 2018.
- The number of peer reviewed publications produced until end of 2017 were over 30, with the students presenting at both national and international conferences.
- Most graduates have continued to enrol for PhD programmes and 5 graduates have registered at international doctorate programmes. An internship programme for the graduates begun in 2017 at SA companies with high expectations to develop their skills for use in R&D.

HCD – Innovation Centres and DST-supported initiatives

1. CSIR and MINTEK Nanotechnology Innovation Centres

- The innovation centres were established to build capacity to develop commercial nano-enabled products. Centres have a strong focus on human capital development by training/developing young scientists who will stimulate growth in the emerging nanotechnology industry.

2. South African Nanoscience and Nanotechnology Summer School

- The school aims to create a pool of nanoscientists sufficiently trained to conduct nanoscience research. The school focuses on training Masters, PhD and experienced scientists.

3. India-Brazil-South Africa (IBSA) Programme

- The programme requires there be sharing of knowledge between India, Brazil and SA. These will be exploited for the development of expertise and skills training in this research areas.



Enkosi Thank you Re a leboga Siyabonga Dankie

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