SA Leads Regional March Towards NANO-ENABLED SOCIETY

Hannelie Coetzee

The sophisticated science of nanotechnology is said to hold unlimited potential for uplifting the poor, for example, through the creation of more cost-effective cement and concrete.

Southern Africa's governments, led by South Africa, are increasingly looking towards science and technology at the nanoscale as a possible solution to some of the region's socio-economic challenges. Lani van Vuuren reports.

According to South African Minister of Science & Technology Dr Mosibudi Mangena, nanotechnology is one of the key features of a new science, technology and innovation strategy being developed for the Southern African Development Community (SADC) following a meeting of the region's science and technology ministers in December. This follows the adoption of the Protocol on Science, Technology and Innovation in August last year.

Speaking at the NanoAfrica 2009 conference in Pretoria in February, Dr Mangena said as the new Chair of SADC, South Africa would ensure that a platform is created for regional dialogue in the area of nanotechnology. Nanotechnology is the act, science and engineering for manipulating objects at the nanoscale (one nanometre is about one million times smaller than a millimetre). "The nano-disciplines have emerged from small beginnings to become one of the most enterprising and promising disciplines in the world of science. For South Africa, the most exciting thing of all is the potential that nanotechnology holds to change the lives of the disadvantaged for the better."

Water treatment for rural communities using nanotechnology has already been tested at pilot scale in South Africa, while there is promise of a more effective tuberculosis treatment due to successes achieved in drug delivery through nanotechnology.

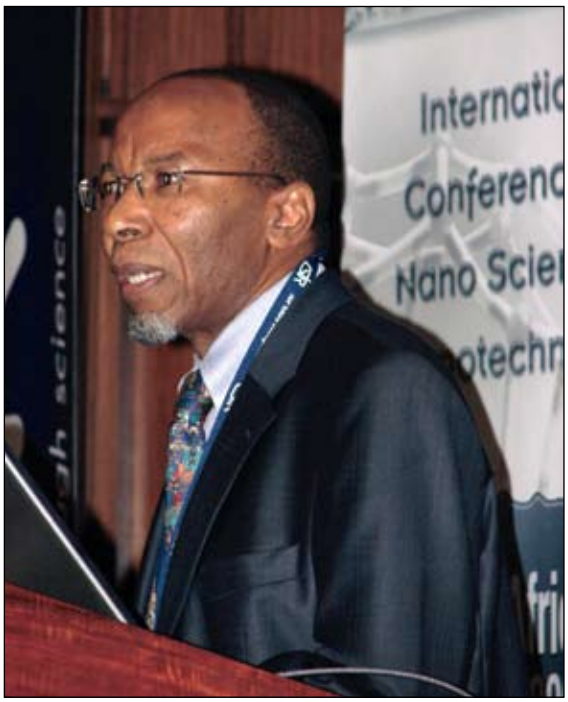
Another potential area in which there has been little local research to date is that of improved production of cost-effective cement and concrete through the application of nano-materials. Delivering a paper at NanoAfrica 2009 Stephen Ekolu of the School of Civil and Environmental Engineering at the University of the Witwatersrand said that the introduction of nano-engineered materials could result in cheaper construction

materials, cheaper and better housing for the poor, durable infrastructure, and improved traditional construction materials. "Materials making up cement can be targeted and manipulated at nanoscale to enhance or generate desirable powerful processes not possible with conventional systems. The real anticipation here is that, ultimately, nano-enabled products will be more efficient, smarter, lighter, faster, stronger and, at the same time, cheaper to produce than conventional products."

The South African government's interest in nanoscience and nanotechnology has been formalised through the National Nanotechnology Strategy, aimed at improving coordination of nanoscale research and development at a national level. South Africa is one of the first countries in the world to have an official nanotechnology strategy.

The implementation plan for the National Nanotechnology Strategy broadly outlines programmes and projects spread over ten years that will contribute to the attainment of the strategy's objectives. They involve the creation of platforms for human capital development, building of infrastructure, and promotion of innovative thinking, ideas and ways of doing things. "In many ways, nanotechnology is already well established and has brought benefits for most during the twentieth century," said Dr Mangena. "Many of its techniques and applications, such as powder metallurgy, catalysis, optical coatings and semiconductor films, have been around for over 50 years."

On top of these there are new materials such as carbon nanotubes, new synthesis methods, such as catalytic and hot-wire chemical vapour deposition and biosynthesis, and new applications for solar cells and thin film transistors. Consolidating old and new, including various academic disciplines, such as chemistry, physics and engineering, under the name 'nanotechnlogy', opens opportunities for developments in new materials, said Dr Mangena.



Lani van Vuuren

Science & Technology Minister Dr Mosibudi Mangena believes nanotechnology could do much to improve the lives of southern Africa's poor.

Following the adoption of the strategy in 2005, two national nanotechnology innovation centres were opened at CSIR and Mintek. While the CSIR National Centre for Nano-structured Materials focuses on materials and energy research, the centre at Mintek concentrates on water, health, mining and minerals. Dr Mangena expressed his delight with the progress at these centres.

He added that the Department of Science & Technology (DST) also encouraged and supported the local nano-community's involvement in collaborative research through various bilateral agreements with other countries. NanoAfrica 2009, which attracted around 200 delegates from 20 countries, also saw the launch of the India, Brazil, South Africa (IBSA) Nanotechnology Forum. During previous IBSA missions health, water, energy and advanced materials were identified as areas of mutual interest for possible collaboration. "All of these tie in with the South African National Nanotechnology Strategy," noted Dr Mangena.

Various IBSA working groups and ministerial meetings had discussed a number of proposals and initiatives, leading to the approval of the IBSA Nanotechnology Proposal in 2007. "The mentoring of young scientists and the development of human resources were seen as key priorities and the implementation of the proposal which commences this year starts with the hosting of a nano-school in India in May," reported Dr Mangena. The second nano-school with a focus on health will be hosted in South Africa in November.

DST has also endorsed the newly-established Nanocentre for Africa at iThemba Laboratories for Accelerator Based Sciences (LABS). The centre is the continental platform for nanoscience and nanotechnology. Its aim is to produce solutions to pressing socio-economic problems related to health, water and energy. "Since nanotechnology is a new area of research in Africa, the centre will have to play a critical role in promoting awareness about it," said Dr Mangena.

In the end, said the DST Minister, nanotechnology had to be applied to create a better world for all. "Nanotechnology's highest and best use should be to create a world of abundance where no one is lacking for their basic needs."