



# awards

# 2007/8

Today's research... tomorrow's innovation



## Top scientists honoured: NSTF awards

Photographer: Johan Cilliers  
Title: Fireworks in the night sky

Emperors Palace, Kempton Park, 27 May 2008

Outstanding contributions towards scientific, engineering and technological development were acknowledged at the tenth National Science and Technology Forum (NSTF) Awards gala dinner on 27 May 2008. Presenting the awards, was Minister of Science and Technology, Mosibudi Mangena.

The NSTF Awards event is unique in that the event affords an opportunity for recognition to all practising scientists, engineers and technologists across the system of innovation including not only researchers, but also individuals who have contributed to the promotion of Science, Engineering and Technology (SET) in other ways; to teams who have developed innovations through organisations and institutions; individuals who have played a valuable mentorship role for young researchers, and science communicators. At the Awards Gala Dinner, educators, schools and learners who excelled in the Mathematics, Science, and Technology fields were also acknowledged. The NSTF Awards represent a collaborative effort by the scientific, engineering and technological community of South Africa, made possible by the participation and sponsorship of a variety of stakeholders.

Says **chief adjudicator, Denis Hunt**: *"Today's research – Tomorrow's innovation emphasises the contribution that dedicated individuals, either working by themselves or in teams, can make in improving the quality of life for current and future generations. Our winners demonstrate that South African SET can stand tall in the world. We can be proud of the NSTF Awards winners and finalists, all of whom could have been winners, and our SET community as a whole."*

### Winners in the respective categories are:

**The category A award: 'Individual over a lifetime' went to Professor Johann R E Lutjeharms – Professor of Oceanography and Ocean Climatology, University of Cape Town** - Over a lifetime of dedicated and innovative research, in both deep sea as well as coastal waters, Prof Lutjeharms has revolutionised our understanding and knowledge of all the surrounding oceans, i.e. from the Southern Ocean to the equatorial regions of the Indian and Atlantic Oceans and how they affect our weather and climate and has stimulated a growing national as well as international interest in the region. The effect of changes in the physical environment, including climate change and environmental degradation on the well-being of the South African people is being increasingly recognised and he has been able to provide decision makers with knowledge to inform their activities. He was one of the pioneers of the use of satellite remote sensing techniques in combination with *in situ* observations.

**The category B award: 'Research and its outputs over the last five years or less' went to Professor Leonard J Barbour, SARChi Research Professor, Department of Chemistry and Polymer Science, University of Stellenbosch** - Hydrogen storage has been identified as one of the key enabling technologies for the widespread use of H<sub>2</sub> fuel cells in stationary, portable and mobile applications. The nature of H<sub>2</sub> makes it difficult to concentrate and it has a low energy density. Physical adsorption into nanoporous substrates has become the focus of research activity worldwide. For the past five years Prof Barbour has focused on the study of unconventional porosity of materials, with the objective of discovering materials which can store gas and particularly hydrogen. A team has been established at Stellenbosch University which is exploring the field of crystal engineering. The work on certain crystals being undertaken is unique. His outputs include unique software and instrumentation as well as new insights in the field.

**The category C award: 'Activities other than research and its outputs over the last five years or less' went to Ms Allyson Lawless, Chair SAICE Section 21 Company Board and Managing Director of her own consulting company** - During her year as the first woman President of the SAICE, Ms Lawless became acutely aware of the skills shortage in the civil engineering profession and undertook a project across the country, including interviews, questionnaires and workshops of and with students, graduates and other sources of input. This culminated in the publication of 'Numbers and Needs: Addressing Imbalances in the Civil Engineering Profession' and a second, similar analysis of the local government situation. These have changed perceptions regarding scarce skills in South Africa where for the first time the extent of the engineering skills shortage has been measured and published. The work is frequently quoted when the topic is addressed at the highest level. The interventions suggested in the books are being very successfully implemented, e.g. the ENERGYS project and the SAICE has itself established a section 21 company for this purpose. UNESCO has proposed that the work should serve as a model for studies in other African countries, as well as in certain first world countries.

**The category D award: 'Innovation developed through a corporate organisation or institution' went to FARMOVS - PAREXEL Team, Chemistry Department, University of Free State** - The team of scientists at the Department of Chemistry, UoFS, in partnership with a team at the laboratories of the company FARMOVS – PAREXEL, have undertaken the synthesis of isotope labelled internal standards and metabolites in the support of novel bio-analytical clinical trials for the registration of new medicines locally and internationally. The internal standards are required in order to calibrate the analytical methods. The availability of sophisticated and rare pharmaceuticals and the ability to synthesise these is necessary to expand the pharmaceutical industry in South Africa. Some 18 standards have been produced for the manufacture and certification of analyses for 17 new products. Ten further standards are in the process of development. A particular focus has been the exploration of indigenous medicinal plants which has been funded by the EU and carried out in collaboration with nature conservation in neighbouring countries. A unique feature has been the output of students: Five Masters degrees have been completed; seven are in progress; and six PhDs have commenced.

**The category E award: 'Innovation developed through an SMME' went to electronic Water Quality Management System (eWQMS), eManti Management (Pty) Ltd, Stellenbosch** - A unique, web-based electronic Water Quality Management System (eWQMS) has been developed by eManti Management Pty Ltd, which is being rolled-out via a successful public-private partnership with the Department of Water Affairs (DWAF) and the Institute of Municipal Engineering of Southern Africa (IMESA) to all 170 local government water service authorities (WSAs). The system distributes a complete water quality management system over the internet. Web technology makes it possible to introduce and apply standards to water samples as they are uploaded to the system, allowing for decisions to be made immediately and water quality to be managed appropriately. The initiative has received sector-wide support evidenced by increased use of the tool. Some 90% of all WSAs load data monthly, compared with 60%, six months ago. Use of eWQMS has been clearly demonstrated to both enable municipalities to more effectively and efficiently manage drinking water services, and to provide strategic data and information to water services sector parties including DWAF, SALGA, the Department of Health and the public.

**The category F award: 'Innovation developed through an NGO / Not-for Profit Organisation (NPO) or Community Based Organisation (CBO)' went to Technology Research Activity Centre Programme of SET Education Support, (TRAC), Department of Civil Engineering, University of Stellenbosch - TRAC** South Africa is a national, non-profit programme, the objective of which is to support physical science, mathematics, and technology education in South African secondary schools. The TRAC Programme seeks to enable and encourage learners to enter into careers in science, engineering, and technology. TRAC is also involved in education intervention programmes, where the main aim is to uplift the standard of physical science education in South Africa. This is done with educator training programmes, vocational guidance assistance, as well as classroom intervention in schools where the resources are limited or lacking. The TRAC emblem has become a familiar hallmark in the endeavour to improve what is being done to enhance science and mathematics amongst school learners, especially in the rural areas. In 2006, in excess of 68 000 learners were exposed to the TRAC programme, whereas during 2007, 109 000 learners were exposed to the programme and 2 831 teachers were trained by TRAC.

**The female recipient of the Eskom sponsored category G award: 'Researcher, for Research Capacity Development over the last 5-10 years' was Professor Maryke T Labuschagne, Professor and Head of Plant Breeding, Plant Sciences, University of the Free State** - Plant breeding is a necessary skill to support agricultural development and a continuous stream of innovation is required. In the last five years, two black PhD and three black South African MSc students, and in the last 10 years 14 black PhD, 8 black MSc, 15 white MSc and 4 white PhD graduates completed their degrees under Prof Labuschagne's supervision. The research by the South African students has led to a firm research relationship between the Agricultural Research Council and the UoFS. The research by the local and international students has in the last 10 years led to 82 publications, and to the establishment of collaboration with universities and research institutes in Malawi, Kenya, Uganda and Tanzania. In particular, the genetic diversity research has led to collaboration with international research organisations and has generated overseas funding. Her unit is attracting black students from South Africa and Africa in increasing numbers and they are becoming part of the global scientific community through collaborative research, leading to better expertise in plant breeding and food security in South Africa and the continent.

**The male recipient of the Eskom sponsored category G award: 'Researcher, for Research Capacity Development over the last 5-10 years' was Professor Ron D Sanderson, Head of Department Chemistry & Polymer Science, Director: Institute of Polymer Science, University of Stellenbosch** - For the past 30 years Prof Sanderson has shaped polymer science training and research in South Africa and in Africa. He leaves a legacy of student training at a level supported by UNESCO, with graduates sought after by South African companies and international institutions alike. Over the past 10 years his institute has produced 12 black MSc, two MTech and nine PhD graduates. In addition Prof Sanderson has promoted/co-promoted 84 MSc and 47 PhD students over his career, with 13 MSc and 16 PhD students currently under his guidance. Extensive publication and patents have resulted. Early successes by his research group included the preparation of glass fibre materials and the development of rocket propellants for defence purposes. Current focus in water treatment research is on low fouling membranes, infrasonic backpulsing and novel capillary membranes for conventional water treatment and desalination. Research has also been carried out on thin films or membrane coatings with practical outputs for the paint and paper industries. Research in the polyolefin area has led to the establishment of a new chair with valuable outputs in the petrochemical industry.

**The male recipient of the NRF sponsored T W Kambule category H award: 'Senior Black Researcher over the last 5 to 10 years' was Professor Christian T Chimimba, Associate Professor Department of Zoology and Entomology, University of Pretoria** - Prof Chimimba's research is mainly in biosystematics where he applies morphometric, DNA sequencing, cytogenetic and GIS techniques in order to focus on species of concern to medical, veterinary, agricultural, economic and nature conservation interests, particularly insofar as they impact on rural communities, but mainly on small mammals in South Africa. His work also focuses on the sub-Antarctic Southern Ocean islands. Prof Chimimba's overall research is centred around four major themes, namely: biosystematics; conservation biology; invasive species biology and management; and the potential influence of climate change on biodiversity and ecosystem functioning. His work is particularly directed at rodents where ca 50 species have been recorded in South Africa. These rodents, through periodic population eruptions, cause problems in the field and in human dwellings, both in the countryside and in cities and can cause enormous damage. His findings have sensitised the relevant authorities such as agricultural, health, municipalities, airports, harbour authorities and local communities to start formulating strategies, policies and screening processes among others in order to deal with these problems.

**No award was made to a female in the NRF Sponsored T W Kambule category H award: 'Senior Black Researcher over the last 5 to 10 years'**

**The female recipient of the NRF sponsored T W Kambule category J award: 'Distinguished Young Black Researcher over the last 5 to 10 years' was Dr Virna D Leaner – Senior Lecturer, Medical Biochemistry, Faculty of Health Sciences, University of Cape Town** - Dr Leaner's widely published research addresses the molecular biology underlying the development of cancer, in particular that of cervical cancer, one of the major diseases affecting women in South Africa. The main objective of her work is to characterise markers of cervical cancer and the role of transcriptional regulation in the development of the disease. Using cell culture model systems, she and others, have shown that extensive transcriptional changes occur in cells during the process of oncogenesis. It is these changes that are of interest as potential markers and therapeutic targets.

**The male recipient of the NRF sponsored T W Kambule category J award: 'Distinguished Young Black Researcher over the last 5 to 10 years' was Dr Robert Tshikhudo, Senior Scientist, MINTEK** - In the nanoscience and nanotechnology field, Dr Tshikhudo has developed biocompatible gold and silver nanoparticles (known as monolayer protected clusters or MPCs) that address a number of problems often encountered in pharmaceutical and biological systems such as stability solubility. Nanoparticles were designed having versatile surface chemistry, and are useful tools for many applications. Importantly, he developed a generic platform allowing the attachment of biomolecular functionality of choice on nanoparticle shells where the attached biomolecules retain their biological activities. Robust, simple and cheap point-of-care diagnostic kits for the detection of malaria, TB, and other diseases are currently under development at Mintek using these nanoparticles, such that they can be used by an individual in the field without the need of a trained professional, and will serve as a first line screening test, in particular for rural areas.

**The recipient of the SAASTA sponsored category K award: 'Science Communicator award over the last 5 years', was Mr Mark Horan, GIS Programmer, School of Bioresources Engineering and Environmental Hydrology, University of KwaZulu-Natal, Pietermaritzburg** - Mr Horan has contributed to the pursuit and understanding of SET through his participation at festivals, shows, school gatherings, open days and university expos. He has a unique ability to engage with a wide variety of audiences on a range of SET topics and issues and has devised practical ways of illustrating complex scientific and technological concepts and ideas. He has been instrumental and passionate in promoting the College of Agriculture, Engineering & Science at UKZN in this way, masterminding many of their exhibits and models aimed at marketing SET programmes and careers. This work is conducted in addition to his day-to-day responsibilities in UKZN's School of Bioresources Engineering & Environmental Hydrology. His personality and drive to showcase science is infectious and he has been successful in encouraging many staff members to participate in SET events and learners and students alike.

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