

June 2011



Faculty of Science NEWSLETTER

**2011 - The International
Year of Chemistry is
celebrated at UJ**

DEPARTMENT CELEBRATES INTERNATIONAL YEAR OF CHEMISTRY

Chemistry in South Africa dates back to around the early 1900's, shortly after the discovery of gold on the Witwatersrand (1886). This burgeoning industry demanded a steady supply of Alfred Nobel's gift to the world – dynamite. The Technikon Witwatersrand traces its roots back to the around the same time, originally as the *Transvaal Technical Institute*, which was established in 1903 to serve the needs of this lucrative gold-mining industry. In this regard, the Department of Chemical Technology is one of the oldest chemistry departments in South Africa. Initially established as a way to skill workers, it has become one of the key departments in the Faculty of Science. The commitment of the academic and

non-academic staff to excellence in teaching, research, community outreach and academic support enables the Department to give life to the inspiring IYC (International Year of Chemistry) global slogan of *Chemistry – our life, our future*.

Since the merger in 2005 many milestones have been attained including the establishment of strategic partnerships locally and internationally, the explosive growth in research projects, and the continual improvements in staff.

The Department continues to serve the chemical industry, with students completing the Diploma in Analytical Chemistry considered as preferred graduates, trained to cope with challenges in the work environment.

THIS ISSUE **FOCUSES ON THE DEPARTMENT OF CHEMICAL TECHNOLOGY**. THE NEXT ISSUE WILL FOCUS ON THE DEPARTMENT OF GEOLOGY AND THE DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT AND ENERGY STUDIES.

MESSAGE

from the Head of Department

The Department of Chemical Technology has become one of the household departments in the Faculty of Science because of the commitment of the academic and non-academic staff to excellence in teaching, research and academic support. Within a short period of time since the merger in 2005, many significant milestones have been attained that include the establishment of strategic research partnerships locally and internationally.

Students completing the Diploma in Analytical Chemistry in the Department of Chemical Technology have been considered by industry to be sufficiently trained to cope with work challenges in the work environment. This is evidenced by the 100% placement of students in the Work Integrated Learning (WIL) programme and the fact that all our students secure employment in various chemical and related industry. The Department's Advisory

Committee, consisting of industry leaders and stakeholders and future employers of the students, also makes strategic inputs to the chemistry content taught to the Diploma students. In January 2011, a new four-year Diploma in Analytical Chemistry was launched and the objective of this qualification is to provide the best training to students who enrol in the department given the under-preparedness of the school leavers for tertiary education. This is the only such programme in Analytical Chemistry in the country, and sets the scene for future programmes.

In response to the HEQF pronouncement on the demise of BTech programmes in South Africa, the Department of Chemical Technology is already making plans to respond to the needs of the market by putting together an Advanced Diploma in Chemistry to replace the BTech in the near future. Furthermore, we are

gearing ourselves for the commencement of a four-year Bachelors degree in Water Science and Materials Technology in 2013, which will be one of the flagship multidisciplinary technical programs of the Faculty of Science and, indeed, the University of Johannesburg.

Another development is the new Taught Masters Degree (incorporating coursework and research) in Nanoscience, the brainchild of the Department of Science and Technology. This degree will be offered as part of a unique collaboration between four universities, namely UJ, the University of the Western Cape (UWC), Nelson Mandela Metropolitan University (NMMU) and the University of the Free State (UOFS) from 2012. This degree is not only offered between four universities, but is an interdisciplinary degree, reflecting the enabling science that is Nanoscience.

The highly qualified and committed teaching staff in the department together with the excellent postgraduate tutors will continue to ensure that high academic standards are maintained in the new programmes through innovative teaching and beneficial practical training for the students.

The Department prides itself in its highly qualified researchers who are making an impact

locally and internationally. The Department has three NRF rated researchers and this number is expected to double within the next two years. In 2011 we welcomed four academic staff into the department namely, Prof JC Ngila, Dr O Arotiba, Dr N Mabho and Dr D Nkosi and they are quickly settling and making a good contribution to teaching and research in the department. The research thrusts and niche areas to be discussed in this newsletter enjoys recognition internationally as evidenced by the strategic research partnership established with local, African and overseas-based research institutions and universities. The institutions abroad include Cranfield University (UK), Technical University of Delft (Netherlands), Indian Institute of Science (India), the University of California, Los Angeles (USA), to mention a few. In the African continent we already have strong partnerships with universities in Cameroon and Swaziland. The Department, through Prof Rui Krause, has recently successfully applied for funding through the Argentine-South Africa bilateral agreement, as well as the trilateral IBSA (India-Brazil-South Africa) research initiative.

With at least 50 Masters and Doctoral students plus 6 Post Doctoral fellows registered

Prof Bhekie Mamba, HOD



with the Department, the research output within the Department of Chemical Technology has exponentially increased in the last six years which attests to the high level of excellent research engagement by research staff, the students and collaborators. The recent appointment of two well-published visiting Professors from Cranfield University and CSIR (Pretoria) is expected not only to add value to the current research endeavours and topics but will also significantly market the department while at the same time improve the throughput rate of postgraduates and cause an increase in research outputs.

Besides funding received from the Faculty of Science, the research in the department is funded from a number of agencies, companies and Government para-statal entities. These include Water Research Commission, Department of Science and Technology (DST) through the Nanotechnology Innovation Centre programme, DST Centre of Excellence (Strong Materials), UJ Centre for Nanomaterials Science, ESKOM, Johannesburg Water and the National Research Foundation. The impact of the funds being secure from the aforementioned organizations and companies have brought about excellent research equipment which complements the existing research facilities within the Faculty at SPECRAU.

The year 2011 has been declared as the International year of Chemistry and the department has decided to play a part in the promotion of chemistry within the university and beyond its perimeters. The department will be involved in giving public lectures, organising conferences, participate in local and international conferences, promoting the awareness and benefits of chemistry to the broader communities. Finally, the department views its achievements thus far as only the beginnings of greater things yet to come.



International Year of Chemistry: phenomenal chemists in the chemistry time line

A glimpse into the history of chemistry reminds us of some of the greatest minds who have contributed immensely towards the groundwork and advances in the field of chemistry. Everything has a beginning and with this said some of the many prominent men in the history of this field include: Jean Rey (1585-1645), Mikhail Lomonosov (1711-1765), Joseph Black (1728-1799), Henry Cavendish (1731-1810) and Antoine Lavoisier (1743-1794) who are all responsible for building on the concept of the law of conservation of mass. Then again, how could we ever survive without gas and the use of it, in lighting and gas stoves? A thunderous applaud has to be furnished to the gentlemen William Murdock (1754-1839), Philippe Lebon (1767-1804), Frederick Winsor (1763-1830) and Friedrich Accum (1769-1838) for making the awesome discovery of gas and the manufacturing thereof. The man Friedrich Accum also made a ground breaking contribution to investigating the effect of chemical additives in food and managed to raise awareness on safe food processing

practices even in his time although this was to his detriment. You've just got to love chemists and their bravery! Accum had to flee England because his stance on food preservatives earned him many food manufacturing *enemies*. If you will, do tell; what is man without ambition? We have a winner in Robert Boyle (1627-1691) and quite a string of other alchemists before and after his time who strongly believed that the transmutation of metals was possible and they carried out experiments to get that gold and silver rolling in! Sad to say, this may not have materialized in his lifetime (if at all it did, it was definitely not in the quantities he could have hoped for!). He and other alchemists paved the way for many more to continue in their pursuit. I mean, we just can't stop dreaming of that ounce of gold can we? Suffice it to say, we have managed to make this a reality in our time and in very handsome amounts through the process: resonant atomic transmutation of metals. I dare say, one of the most distasteful words of all times amounts to the term germs. We have to thank Louis

Pasteur (1822-1895) for his breakthrough in the causes and prevention of diseases. His discoveries made sure that germs in milk products do not get to see the light of day by passing milk through a process termed pasteurization. Last but not least, we have a lady who puts a smug smile on faces of all women across the globe and she is the one and only Marie Curie (1867-1934). Why again, is every single lady out there proud of her? It could be the string of achievements she had up her sleeve, or the fact that she was the first woman to win a Nobel Prize, one of the first female professors of her time and the only woman to be honoured with a Nobel Prize in multiple fields of science and the list goes on. In plain English, she was brilliant and she put women on the scientific map and was an inspiration to many! There are many varied invaluable contributions by numerous scientists whose combined input spans centuries up to our time and we owe them all gratitude for laying a solid foundation for us. So now all we have to do is built on and on and on!



Dr Mbianda and some of his research students



Thabo Nkambule, new generation scholar doing some organic carbon analysis in water samples.

Research in the Department of Chemical Technology at UJ

The Department of Chemical Technology has a long history, having been part of the Technikon Witwatersrand since its inception more than 50 years ago. Until the mid 1990's, however, there was no formalised research at any of the Technikons in South Africa. Instead, these institutions were closely associated with local Industries, training students to work as analysts and technicians, and conducting what we can now think of as *contract research* and analyses for the various industries. The high lecturing loads and lack of funding prevented the department from hosting postgraduate students until after 1999.

The origin of the existing research thrusts lie partly in the contract research, when in the early 2000's a group of young researchers were approached by the Water Research Commission to look at technologies to remove a rather smelly chemical, geosmin, from tap water. This small group, with a grant of around R100 000, transformed an empty laboratory, bought chemicals and borrowed equipment to conduct research, and payed bursaries for the first two postgraduate students. In addition, two lecturers in the department also registered their DTech degrees (Technikons could not offer PhDs at the time).

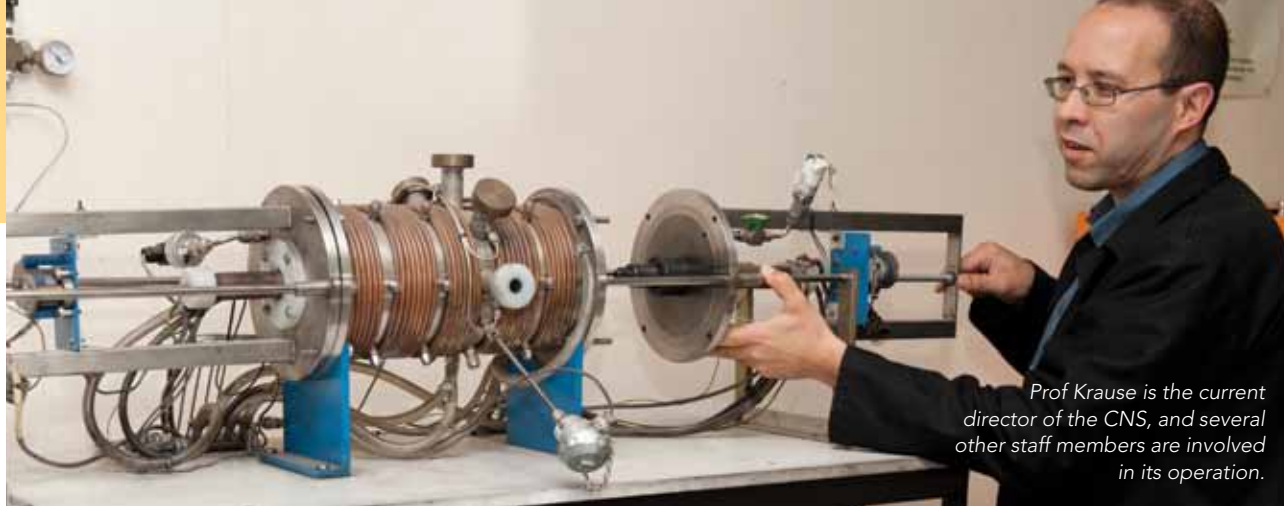
This niche area or *group-wise* development of research was later supported by the NRF through their Research Niche Areas Programme, and the Department developed two related but independent areas, namely Water Treatment and Carbon Nanomaterials, both established around 2005 with the first Masters and PhD students.

This niche area approach has some advantages, and has enabled the development of a vibrant research community that is still growing. It is hard to believe that the Department has come so far from practically an empty lab in just 6 years. the Department proudly host one of UJ's Research Centres (Centre for Nanomaterials Science), as well as part of two national research centres: the DST/Mintek Nanotechnology Innovation Centre – Water Platform, and the DST/NRF Centre of Excellence in Strong Materials.

The research is still mostly organised in research thrusts who share common laboratory and equipment space, but this has diversified from the original two areas through the addition of complementary fields. Since many researchers in the department are considered young researchers, students are mostly supervised by a team of two or three researchers.



Total Organic Carbon Analyser used in water analysis



Prof Krause is the current director of the CNS, and several other staff members are involved in its operation.

SOME OF THE MAIN RESEARCH AREAS:

WATER TREATMENT:

We have developed some polymer-based materials for removing pollutants from water. The polymers are useful because they can be moulded into films, fibres, or tubes as needed. This means we can now use the materials as adsorbents similar to the materials used in the water-filters in the kitchen, or we can make advanced membranes such as those used for desalination.

NANOMATERIALS:

Nanomaterials are finding application in health, energy, materials, electronics, computing, and many more. Our research focuses on the synthesis and application of a large range of nanomaterials, from carbon materials like nanotubes, to metals such as gold nanoparticles, and organic materials like polymersomes. There is almost always an application of the

nanomaterial in each project. This applied chemistry includes drug delivery, energy research, water treatment, water splitting and more.

MEDICINAL CHEMISTRY:

In this research thrust the focus is on the development of drug-delivery systems for diabetes, cancer, HIV, and TB. Many of the nanomaterials developed in the department such as carbon nanotubes are being applied to the treatment of disease. Some of this research requires functionalisation of nanotubes with phosphorus groups, or the construction of nanomaterials for cancer phototherapy, or just the use of polymer nanomaterials for delivery of existing drugs.

NATURAL PRODUCTS:

Related to the medicinal chemistry thrust, some students are researching the isolation of organic natural products

from African plants and their application to treating disease, or to industrial processes.

ELECTROCHEMISTRY:

A recent thrust is the development of electrochemical techniques as probes and sensors for detecting pollutants and biomarkers of disease. These techniques require the adaptation of electrodes with nanomaterials or biological agents.

ANALYTICAL / ENVIRONMENTAL CHEMISTRY:

The construction of materials brings with it the need to develop analysis techniques and methods. The Department has invested over R10 million in analytical equipment from HPLC to ICP, and has developed the human capital in parallel with this. Several staff members are now using the instruments as tools,

not only for the analysis of materials, but for research into better analysis methods and their application to environmental problems.

POLYMER RESEARCH:

The availability of well constructed nanomaterials allowed an effective polymer and composites research thrust to develop recently. This includes the availability of a rheomixer for making polymer blends.

COMPUTATIONAL CHEMISTRY:

In this research projects are designed to use computational techniques to confirm and predict the properties of materials. This is a fairly new thrust, and has partly been hampered by the lack of computational hardware, however the recent developments at the Centre for High-performance Computing is opening this research.

Natural Products and Nanomaterials staff and students.

Dr Pandey (PDF) 2nd from left, Prof Mbafor from Cameroon 5th from left and next to him Dr Ndinteh, front Prof Krause





Researchers in the Department

Prof Bhekie Mamba leads the research on Water Treatment. His interests include the use of novel polymer materials as cheap and stable adsorbents that can be used primarily to remove organic pollutants from drinking water. Most drinking water treatments in South Africa are either quite costly or energy intensive, but they are also often somewhat ineffective at removing organic pollutants to ultra-low levels. This combination of factors means that it takes a great deal of effort to clean water so that it is suitable for human consumption. Clean drinking water is the main focus of the UJ Water and Health Research Centre, which is a multidisciplinary Centre consisting of Departments from the Faculty of Science, the Faculty of Engineering and the Built Environment, and the Faculty of Health Sciences. Professor Mamba is also the Director of the Nanotechnology Innovation Centre – Water Platform (NIC). This platform is sponsored by the DST and is a partnership between UJ, the University of the Western Cape and Rhodes University, as well as the Advanced Materials Division of Mintek. The NIC looks at the research and development of new technologies for water treatment. Partnering with Mintek allows a development group based there to look at the best technologies and suggest ways to develop these as viable commercial entities. This NIC is one of only two nationally – the other is located at the CSIR and focuses more on Energy and Materials Characterisation.

Prof Catherine Ngila joined the Department this year from the University of Kwa-Zulu Natal. Her area of research is on Environmental and Analytical Chemistry. Students in Prof Ngila's group are involved in using various analytical techniques such as HPLC, AA, and ICP to understand the impact of human activities on our environment. Part of her work is to develop new methods to analyse and detect ever smaller amounts of dangerous pollutants. These pollutants tend to bioaccumulate and increase in concentration as they move up the food chain. This work is closely linked to the work on new adsorbents for removing pollutants.

Prof Rui Krause heads up the UJ Centre for Nanomaterials Science as well as the UJ section of the Centre of Excellence in Strong Materials. This research is about the synthesis and characterisation of nanomaterials such as carbon nanotubes and polymer nanoparticles, as well as their application to a range of areas such as drug delivery, photovoltaics and photodynamic cancer therapy, as well as water treatment. Acquisitions of key equipment over the past five years has allowed the Department to perform many of the needed nanomaterials analyses in-house, which in turn has greatly improved the research output of the Department. Prof Krause also heads up the Medicinal Natural Products group, which is involved in discovering and developing active pharmaceutical ingredients from African

medicinal plants in collaboration with researchers in Africa.

Dr Xavier Mbianda is also a member of the Nanomaterials Centre, but his focus is on the unique application of nanomaterials that are modified with phosphorus groups. These materials such as bisphosphonates and phosphino-carbon nanotubes are finding interesting medicinal applications in anti-cancer treatments. The ability of phosphorus groups to chelate metals also allows these materials to be used in environmental clean-up operations.

Drs Ajay and Shivani Mishra are active researchers in organic and inorganic nanomaterials, respectively. These materials include polymers, nanofibers, and ceramics, and are being applied to biosensors, adsorbent nano-composites, and thin-films. Both Ajay and Shivani have published extensively since they came to UJ, and Ajay is currently on the editorial board of the Journal Advanced Materials Letters.

Dr Omotayo Arotiba joined the Department last year, and brought much needed expertise in the use and application of electrochemical techniques. These techniques allow for the construction of a range of biosensors such as those for detecting disease. Omotayo has been able to set up an electrochemical lab, including two workstations for near complete characterisation of new sensors.

The Department has also

recently grown through the addition of new staff members including **Dr Sarah Maola** whose research is a combination of electrochemistry and natural products, **Dr Nonhlangabezo Mabho** who joined the Department from Germany with industrial experience in new analytical techniques such as the determination of diffusible hydrogen in steel by hot extraction and melt extraction methods, and **Dr Dudu Nkosi**, whose interests in the application of phthalocyanines will fit very well with existing research.

The Department has one of the highest number of academic staff with PhDs' of any Department, partly due to the commitment of many staff members in continuing and upgrading their qualifications. In the past four years, 5 staff members have obtained their PhDs, and three received Masters degrees, and others are due to graduate soon, including Wendy Maxakato and Kriveshini Pillay. This tradition of improvement continues with a further 4 staff members registered for their PhDs while holding down full-time jobs (and being full-time mothers and fathers in many cases).

Dr Xavier Yangkou Mbianda's research group interest can be divided into two main fields:

- 1- The synthesis of bioactive organophosphorus molecules and ligands for radiopharmaceuticals. This program is done in collaboration with industrial and government partners. (NRF, SANHARP, NECSA)



2- The synthesis of phosphorylated nanomaterials. This program was set up to develop new materials that combine the extraordinary physical, mechanical, and electrical and adsorption properties, of nanomaterials with the chelating, and biological properties of organophosphorus moieties. It can be divided in four broad areas corresponding to the potential fields of application.

Other research

- Water purification and industrial waste treatment

In this section the adsorption and complexation properties of carbon nanotubes, cyclodextrins, chitosan, cellulose etc... are rationally combined with the chelating properties of organophosphorus functions (phosphine, phosphonates, phosphates etc) in novel materials able to simultaneously extract organic and inorganic matters from aqueous solutions. These materials have been successfully used for water purification, for metal extraction (Hydrometallurgy) and have shown great potential

in industrial waste treatment.

- Nuclear waste treatment

Phosphorylated carbon nanotubes are polymerized and used as extractants in the treatment of radionuclear waste. This project is done in collaboration with the Nuclear Energy Corporation of South Africa, aims at reducing the amount of secondary waste secondary waste currently produced in the nuclear industry.

- Drug delivery systems

Carbon nanotubes (CNTs) have been proposed and actively explored as multipurpose innovative carriers for drug delivery and diagnostic applications. In this program CNTs with different phosphorus entities for simultaneous targeting, imaging and therapy of diseases are functionalized. In collaboration with the radiochemistry unit at Nuclear energy corporation of South Africa (NECSA), work is done on the development of bisphosphonate linked-multiwalled carbon nanotubes, as potential pain-reliever drug for secondary bone cancers.

Research on natural products

Nature is an immense reservoir of bioactive molecules. Science abounds with many therapeutic drugs of natural origin, and since large segments of the world's populations are still either partially or entirely dependent on plants for their health needs there is a certain responsibility on science to explore these. These remedies are often steeped in a tradition of indigenous knowledge, where a largely oral history has handed down the preparation and use of plant-based products. Around half of all the existing pharmaceutical agents in use around the world were derived from natural products, and this still forms the basis of many of today's drug-discovery programmes around the world. Even with traditional remedies, which are used on a daily basis by over 40% of the world's population, there is a need to investigate, corroborated, standardized, enhance, and then integrate these systems into national and international healthcare systems.

In the Department of Chemical Technology the Medicinal Natural Products research group is focusing on the study of medicinal plants used in various areas of the African continent. There are three main research themes that are often investigated in tandem:

1. Identifying plants used in traditional health care systems and evaluating them scientifically – looking at the activities, potential novel compounds, chemical variation around the continent, etc.
2. Detailed phytochemical analyses of some of the plant activity, from the point of understanding how plants are used, developing better and safer therapeutic doses, and understanding how these treatments can be applied as novel therapies.
3. Using plant derived molecules as part of integrated Drug Delivery Systems based on nano-enabled technologies.





Prof Krause with students of the Nanocentre and from the Department

UJ Centre for Nanomaterials Science (CNS)

The CNS was established as a Centre earlier this year (2011) and consists of several scientists in the Faculty of Science, the Faculty of Health Sciences and the Faculty of Engineering and the Built Environment. The Department is extremely proud to host this Centre and has nearly 40 postgraduate students undertaking research at the Masters and Doctoral level within the Centre.

The activities of the Centre include the investigation of materials as diverse as metals, quantum dots, carbon nanotubes, dendrimers and soft polymers.

The Centre has extensive experience in the synthesis and characterisation of nanomaterials, including the use of electron microscopy, spectroscopy, and surface techniques. The main focus of the Centre, however, is not only on these fundamental studies of the materials and their properties, but on the application of nanomaterials. The South African Nanomaterials and

Nanotechnology strategy has highlighted a number of areas of importance, including provision of clean water using nanomaterials, development of nano-enabled sensors for health detection, and nanomaterials for mining and mineral extraction.

The main aims of the Centre are:

- 1) The synthesis and characterisation of a range of nanomaterials of both organic and inorganic origin
- 2) The application of nanomaterials to water treatment, health, energy, and strong materials
- 3) Investigating the environmental and toxicological consequences of nanomaterials, especially in water
- 4) Training of students in the skills needed for synthesis, characterisation and application of nanomaterials

Prof Krause is the current director of the CNS, and several other staff members are involved in its operation.

Students doing fire training





Technical Staff in the Department of Chemical Technology

Technical Laboratory Staff go beyond the call of duty

The Technical Staff in the Department are without doubt a vital part of the success, working hard to keep the undergraduate labs running smoothly, making sure that chemicals are stocked and equipment is serviced. Their contribution, however, is not limited to these *duties*, and perhaps this short story is an example of how lecturers and the technical staff are willing to go the extra mile for our students: Miss Beleng is an S1 Analytical Chemistry student in the Department of Chemical Technology who started her Diploma this year. She could testify that the transition from school to university is not necessarily smooth sailing. All too often, students find themselves having to learn a multitude of new analytical techniques that they are not familiar with, and the stress of university and independent

learning can result in ever declining grades. Miss Beleng, has of late, not been doing very well in her Analytical Chemistry practical work. Her recent practical mark by mid term dipped down to nearly 20%. Luckily for her the pattern of poor marks was noted by her lecturers who intervened to help her with her work. The lecturer arranged for her to spend some extra time with the technical staff where the technicians gladly assisted her. They helped her brush up her analytical technique, and soon after that, in the successive weekly practical laboratory sessions, she got an amazing average mark of 84%.

When asked about her improved practical work mark, Miss Beleng only smiles shyly, not believing what she is capable of, and says thank you to the practical staff.



Miss Beleng, Analytical Chemistry diploma student



Dr Shivani Mishra and (soon to be Dr) Kriveshini Pillay in China.



Scientists young and old networking and sharing a break.

Department hosts great conferences:

Staff in the Department have recently been involved in the organisation of several important conferences around the world. Since 2011 is the International Year of Chemistry, it was fitting to be involved in the South African Chemical Institute's National Conference in January, held at Wits University. This conference brought together not only scientists from around South Africa, but incorporated the 3rd Meeting of the Federation of African Societies of Chemistry. Details of the conference were reported in earlier newsletters (see April 2011), but suffice it to say that almost the entire Department was involved in presenting lectures, posters, or just attending this wonderful event, which was a pre-launch of the UNESCO International Year of Chemistry. The conference brought together international experts including Sir David

King, and Prof Martyn Poliakoff.

Then, a few months later the Staff from the Department and the Centre for Nanomaterials Science were involved in organising the 1st International Congress on Advanced Materials (AM2011) in China – see article below.

The third conference to be organised this year is the 11th International Conference on the Frontiers of Polymers and Advanced Materials, incorporating the second BioMaterials Africa conference. Prof Krause is the current Chairman of the BioMaterials Association of South Africa (BioMatASA), under whose auspices the BioMaterials Africa is held. This well established event is travels around the world since its inception in India, and this year is being held in the end of May at the University of Pretoria.

China Conference

The AM2011 is an international formal congress proposed by the International Association of Advanced Materials (IAAM) and was hosted by University of Jinan (UJN) (Shandong, China) in May 2011. The congress was jointly organized by the IAAM, UJN, Journal of Inorganic and Organometallic Polymers and Materials (JIOPM)-Springer, the IAAM's official journal Advanced Materials Letters (AML), The Chinese Ceramic Society and Key Laboratory for Liquid-Solid Structural Evolution and Processing of Materials (Shandong University), Ministry of Education. The conference is also supported by Polymers & Polymer Composites (PPC), Advanced Materials Research (AMR) and Journal of Materials Chemistry (JMC)-RSC Publishing.

Staff members of the Department of Chemical Technology as well as their international colleagues have organised this first International Congress on Advanced Materials. Dr Ajay Mishra, conference Secretary and member of the International Advisory Committee, delivered an invited lecture at the conference. More than 15 researchers from South Africa attended the congress.

IAAM had announced Albert Einstein MEDAL, LINUS PAULING MEDAL and Scientist Award during the Congress. The top five scientist award has been given to the scientists across the world.

Dr Ajay Kumar Mishra, from the Department of Chemical Technology, has been selected

as one of the top five IAAM-Scientist and received the 2011 Scientist Award for his great

contribution in the field of Materials Science and Technology.



Dr Mishra receiving an award during the conference

New lecturer in the Department

New lecturer Dr Mabho recently joined the Department after studying in Germany. She was an Analytical Chemistry student, completing her National Diploma in Analytical Chemistry, from the Walter Sisulu University of Technology (former Border Technikon), where she obtained a German Scholarship (from the Carl Duisburg Gesellschaft) to study further at the University of Duisburg-Essen in Germany.

The programme involved *learning by doing* which involved internships in ThyssenKrupp Steel Europe (TKS) Company and at the University of Duisburg-Essen while studying towards either an MSc or PhD. There she learnt to speak and write German, and discovered that Germans invest heavily in the future of their country by

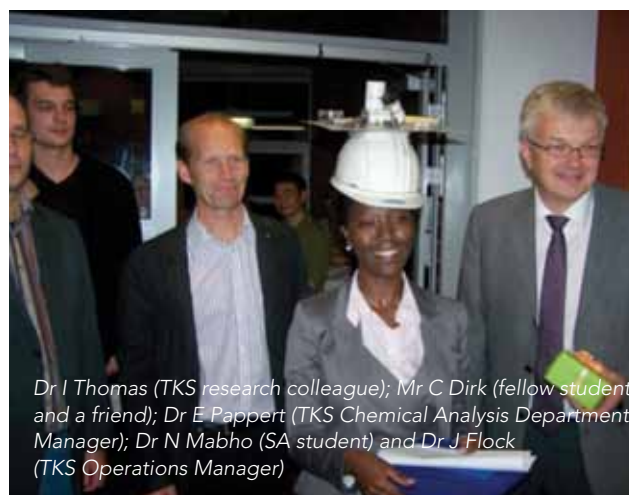
opening up internships for students at early school levels. This programme has a section that is open to grade 8 learners and is aimed at exposing the students to the business world so that they have a good idea about potential future careers and what is required to reach their goals.

Although the cold weather was a great challenge, this opportunity paved the way for her to successfully complete her PhD in *Natural Sciences* with a good deal of industrial experience under her belt. Presently Dr N Mabho is employed as a lecturer in the Department of Chemical Technology and is developing her research interests in inorganic chemistry – she's also learning to use a non-German keyboard.

Visit to the University of Buea

Recently Prof Krause and Dr Ndinteh visited the University of Buea in Cameroon to offer a short course in Nanomaterials. This University sits at the foot of the most active volcano in Cameroon, Mount Cameroon. Although the University has few resources, they are very active

in graduate and postgraduate research. This visit paved the way to future collaborative projects between Cameroon and the Department. Already four students have visited the Department to continue their studies in chemistry.



Dr I Thomas (TKS research colleague); Mr C Dirk (fellow student and a friend); Dr E Pappert (TKS Chemical Analysis Department Manager); Dr N Mabho (SA student) and Dr J Flock (TKS Operations Manager)



Mr Mike Viljoen and Prof Bhekhe Mamba

Mike farewell

Mr Mike Viljoen was a part of the Technikon for many years, being largely responsible for the success of the advisory committee and Work Integrated Learning Programme.

Recently Mike retired and the WIL programme has now been taken over by Louise.



Prof Krause visited the University of Buea in Cameroon.



The **FACULTY OF SCIENCE** is a vibrant, dynamic and diverse scientific community that is a premier centre for the generation, dissemination and application of knowledge in the natural sciences and technology.