

## Visiting Professor

CMRP and the Illawarra Cancer Care Unit held a joint scientific seminar recently and invited Associate Professor Wolfgang Tome from the School of Medicine and Public Health, University of Wisconsin to present a seminar on the optimization of radiotherapy using biological parameters. His seminar outlined his new concept titled "Risk adaptive Radiotherapy" which includes an approach to treating small sub-volumes of active tumour identified by PET or MRI to very high radiation dose levels to maximise tumour control and minimise side effects.

Professor Tome is based in one of the most famous medical physics centres in the USA. This is the university site that includes Professor Tomas Rockwell Mackie on its staff, the inventor of the Tomotherapy machine, a new linear accelerator based treatment modality.

Professor Tome has published many papers in radiotherapy physics. His publications also include many seminal works in radiobiology.

Professor Tome is also currently hosting one of Professor Peter Metcalfe's (CMRP) PhD students (Nick Hardcastle, a Rotary fellow) as part of the Faculty at University of Wisconsin, Madison. Nick is working on new dosimetry systems developed by Professor Anatoly Rosenfeld to measure dose from Tomo-

therapy machines when cancer patients are treated. The clinical sites being investigated are scalp and prostate.



From left to right: Prof Anatoly Rosenfeld (Director, CMRP UoW), Dr Kerwyn Foo and Dr Andrew Miller (Radiation Oncologists, Illawarra Cancer Care) A/Prof Wolfgang Tome (Guest speaker, University of Wisconsin) Prof Peter Metcalfe (CMRP, UoW) Dr Martin Carolan (Director of Medical Physics, Illawarra Cancer Care)

## Dean's Spot

We have just welcomed over 340 new students into our undergraduate engineering and physics degrees, and over 130 new international post-graduate students to our Faculty for the commencement of the new year 2008. This is a record number of new students for the Faculty and we're very pleased it continues to be a popular choice for so many talented students nationally and internationally.

These healthy enrolments are across all our engineering areas of civil, mining, environmental, mechanical, mechatronics and materials, electrical, computer and telecommunications, and physics – including its medical radiation specialisation.

We think this is because there is a greater realisation than ever before of the need for more engineers to solve the 'big picture' iconic problems of our age including climate change, the need for clean water, more efficient manufacturing, reliable and healthy food supplies, finding solutions to transport, pollution, medical care and health issues and so on. Living in the world fundamentally requires engineering creativity, and professional engineers are made at University!

One example of a 'big picture' problem being solved in our Faculty is our recent development of new food processing methods to improve the quality of fresh food delivered to cities from farms. Farms are often remote from cities, and the treatment of food imme-



diately after harvesting and before and during its transport to cities has a great impact on its taste, texture, shelf life and healthiness. Unless it is treated very soon after harvesting to remove organisms and bacteria that can breed and cause contamination fresh food can be a severe health risk, as shown for example by various salmonella outbreaks around the world which have been blamed on foods such as salads.

Treatment methods often include holding vegetables at a particular temperature for a certain time (eg 90 degrees centigrade for 60 seconds) followed by chilling. Conventional heat treatment, such as exposure to steam, takes quite some time to heat a vegetable right to its centre since the heat can only travel from the outside. The fundamental physics of this situation means this process will always damage taste and texture. Microwave heating on the other hand can heat the whole vegetable, inside and outside, at the same time, so the required temperatures can be reached with less damage. Also, because of the high speed heating possible with microwaves, there are significant additional benefits; there is a substantial saving of energy as well as water (steam).

The development of microwave technology for industrial use, where several tons per hour of fruit and vegetables must be processed,

and every single part must be heated correctly, is still in its infancy. A materials handling and robotic system has to be combined with sophisticated design and control of the microwave power to make this work properly. Our Faculty has put together a multidisciplinary engineering team of electrical, mechanical and computer engineers to solve this problem, and after extensive trials during which our laboratory was full of broccoli, carrots, apples and an amazing assortment of other fruit and vegetables, we were able to demonstrate the effectiveness of microwave treatment. We are now proceeding to build Australia's first large scale industrial microwave treatment plant for fruit and vegetables and we are planning to apply this technology to many other foods in the near future.

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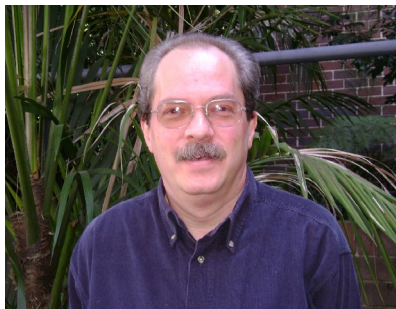
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## Staff News

While on study leave at UIT/Chartres (Universite d'Orleans), France, Dr Konstantin Konstantinov (Kosta) was invited to give two lectures in French to students and academic staff members. The lectures were based on Kosta's research activities in "Energy Storage Materials and Devices" and were so well received that the *Republique du Centre* newspaper published an editorial about the lectures and a profile on Kosta.

A collaborative research arrangement has now been developed with UIT on nanostructured oxides for application in cosmetic projects as protection from UV radiation.



## Route to the Top

Spencer Stuart, one of the world's leading executive search consulting firms, which publishes 'Route to the Top', has formally analysed the undergraduate qualifications of CEO's listed in Standard and Poor's top 500 companies in the world. Their findings in 2006 and 2007 identified Engineering, Business Administration and Economics as the top three most common undergraduate degrees with Engineering dominating in both years.

## Diary Dates

4 Mar	WAC Committee
11 Mar	CME School Committee Phys School Committee MMM School Committee
18 Mar	Faculty Education Committee
25 Mar	Faculty P/G Research Committee

## Congratulations

### Engineering student accepted into Nuclear Futures Graduate Program

Paul Barron, a final year student in Engineering, has been accepted into the Nuclear Futures Graduate Program at the Australian Nuclear Science and Technology Organisation (ANSTO). The program is four years in length involving six-monthly rotations between divisions for the first two years and placement within a division for the last two years. Some of the options for rotation include Reactor Operations, Materials, Radiation Safety and Technical services and Facility Management.

This is the first year ANSTO has organised a graduate program, selecting 15 scientists and engineers from around the country. Currently, Paul is completing the professional experience component of his degree at ANSTO and is a member of the sample environment team at the Bragg Institute, which is Australia's neutron scattering organisation located at the OPAL reactor site at Lucas Heights.



Paul Barron

The role of the sample environment group is to design and operate equipment used to create certain physical conditions for scientists to conduct their experiments, such as furnaces, cryostats, magnets and electronic fields. The materials of interest are placed inside these sample environment devices, which are, in turn, placed on the stages of Neutron beam instruments. Specifically, Paul's involvement deals with the control and motoring of these devices, remotely, over the network.

### Endeavour Scholarship Recipient

Sima Aminorroaya-Yamini has been awarded a \$25,000 Endeavour Postdoctoral Research Fellowship to carry out research on experimental and thermodynamics of low alloy steels to develop phase equilibria using the CALPHAD technique. She will be working with Professor Ishida at Tohoku University in Japan for six months.

The Endeavour Awards are an internationally competitive, merit-based scholarship program sponsored by the Australian Government. They enable leading researchers, students and executives in



Sima Aminorroaya-Yamini

Australia to travel abroad to undertake short or long term study, research and professional development in a broad range of disciplines. It also allows overseas researchers to travel to Australia for the same purpose.

Sima believes she was awarded the fellowship due to her publications, research and professional background.

Before arriving at UOW, Sima completed a Master of Materials Science and Engineering from the Isfahan University of Technology in Iran. She commenced a PhD, researching the experimental and mathematical simulation of centerline precipitates in a new generation of low carbon steel, in 2005 under the supervision of Professor Rian Dippenaar, and will graduate in 2008. In her time at UOW she has published 3 journal papers, 2 conference papers and delivered 3 presentations at international conferences. Her presentation at the EUROMAT 2007 conference, which was held in Nuremberg, Germany, was selected as a highlight talk.

During her working life in Iran, Sima was the Director of a research company and also a consultant to leading Iranian steelmaking companies. In 2004, she received the award "Most Successful Female Entrepreneur" of the Province.

Sima was a member of the Faculty Postgraduate Research Committee at UOW and has enjoyed meeting and developing new friendships with staff and students from many cultural backgrounds.

"I have really enjoyed studying in the Faculty; everyone has been very helpful, supportive and friendly".

When not undertaking research, Sima enjoys going to the beach and painting Persian miniature art.

After completing the fellowship in Japan, Sima will move to Brisbane to take up a Postdoctoral Fellow position at the University of Queensland, conducting research on pyrometallurgy with Professor Hayes.