



*MQ Photonics Newsletter* is an informal internal publication of the *MQ Photonics Research Centre* <<http://web.science.mq.edu.au/groups/mqphotonics/>>. We aim to distribute it by e-mail every 3 weeks. Please send copy to <[lizb@physics.mq.edu.au](mailto:lizb@physics.mq.edu.au)> by 9 a.m. every 3rd Tuesday. Next due date: **TO BE ADVISED**



## Showcase Day – 20 Nov '09

An opportunity to get together, see what is going on in *MQ Photonics*, talk about research, and meet up with our new Advisory Board ...

10 – 12: Intro & five talks (E7B T2)

12 – 1.30: Lunch & posters (E7A L4)

1:30 – 3: Advisory Board Meeting

3 – ... : Research lab tours

*Please consider submitting your work for poster presentation ...  
... only 12 posters will be selected*

Registration: [lizb@science.mq.edu.au](mailto:lizb@science.mq.edu.au)

## Focal Points

### *MQ Photonics Showcase Day – coming soon ...*

The past year has been a period when the Centre for Lasers and Applications (CLA) has become a more and more distant memory, as our ~2-year-old *MQ Photonics* Research Centre has established an identity of its own. It has also been a period in which we have been required to trash our original *MQ Photonics* logo in favour of Macquarie University's new "OneVoice, One Image" logo. More importantly, it has been a period that has seen establishment of a Macquarie University OSA Student Chapter (members are shown above in two of their favourite pastimes – having a barbecue and enjoying a soccer tournament). And it has been a period to dream dreams – about exciting new science & technology and about major research centres (such as renewal of the CUDOS Centre of Excellence in which some of our members have been so actively involved).

The forthcoming *MQ Photonics Showcase Day on Friday 20 November* will enable us to take stock of our recent progress and to plan for the future, assisted by our newly established Advisory Board which will meet on that day. The programme outlined above will start in E7B T2 with a welcome and introduction from me as Director of *MQ Photonics*, followed by **five invited talks by *MQ Photonics* members**, as follows:

- Dr Jon Lawrence "Astrophotonics"
- Assoc. Prof. James Rabeau "Nanodiamonds"
- Assoc. Prof. Mick Withford "Microfabrication – CUDOS@MQ and NCRIS interests"
- Prof. Ewa Goldys "Biophotonics"
- Eduardo Granados "Ultrafast lasers"

Other details of the Showcase Day programme are outlined below. In particular, we expect the **lunchtime poster session** to be a lively opportunity for everyone to get to meet members of the Advisory Board and to show, tell and learn more about what we are all doing in *MQ Photonics*. *Posters are invited for selection ...*

*... submit your author list and poster title to [lizb@science.mq.edu.au](mailto:lizb@science.mq.edu.au) not later than Thursday 5 November.*

Time: 10am–..., Fri 20 November Place: E7B T2, ... **MQ Photonics Showcase Day Programme**

TENTATIVE PROGRAMME:

10:00-10:10	Assembly, registration, etc. in E7B T2	<b>Note:</b> Entry to E7B T2 is via E7A level 3
10:10-10:20	Welcome and introduction by <b>Prof. Brian Orr</b>	<b><u>Quiet please – exams in progress!</u></b>
10:20-10:40	Talk by <b>Dr Jon Lawrence</b> on "Astrophotonics" (E7B T2)	
10:40-11:00	Talk by <b>Prof. Ewa Goldys</b> on "Biophotonics" (E7B T2)	
11:00-11:20	Talk by <b>A/Prof. James Rabeau</b> on "Nanodiamonds" (E7B T2)	
11:20-11:40	Talk by <b>Eduardo Granados</b> on "Ultrafast lasers" (E7B T2) – <b>AIP Student Prize practice talk</b>	
11:40-12:00	Talk by <b>A/Prof. Mick Withford</b> on "Microfabrication – CUDOS@MQ & NCRIS" (E7B T2)	
12:00-13:30	Lunch and poster session (E7A level 4 tearoom)	<b>Please leave E7B T2 quietly via E7A level 3</b>
13:30-15:00	<i>MQ Photonics</i> Advisory Board meeting (E7B 161)	
15:00-16:00	<i>MQ Photonics</i> research lab tours (optional)	

## ARC Grants – history repeats itself?

This time last year, in Issue 10 of the *MQ Photonics* Newsletter, I wrote:

"It is an understatement to say that the outcome of the recently announced ARC Discovery Project round was a great disappointment, especially in view of all of the rigorous preparation and keen aspirations that the proposals from *MQ Photonics* members represented."

Last week's ARC funding announcements are equally disheartening for many and one could very well suggest that history has repeated itself. However, we in *MQ Photonics* actually fared significantly better than last year. Warm congratulations to the successful recipients of the following four competitive ARC grants – two for Discovery Projects (DP) and two for Linkage Projects (LP):

**DP1095465**      **Administering Organisation:** Macquarie University

**Project:** "Novel coding and decoding in suspension arrays for accelerated biomolecular discovery and personalised medicine," by **Prof JA Piper; Dr Dayong Jin; Dr RC Leif; Prof JP Robinson**

**Awarded 2010:** \$132,033; **2011:** \$85,000; **2012:** \$118,908 (including an APD for **Dayong Jin**).

**Project Summary:** This project will establish an advanced multiplexing technique to rapidly analyse complex biological mixtures, such as cell lysates, food samples or body fluids. It will enable the analysis of not tens, but thousands or more distinctive molecular targets in a single test. This will build the foundations for future generation bioassays, paving the way to emerging personalised medicine. This will lead to new personal diagnostics tools for rapid genotype profiling, to better tailor therapy to the individual patient's specific characteristics. As well as the potential to improve health outcomes, the project will generate significant intellectual property and the opportunity for development of new diagnostic instrumentation in Australia.

**DP1094439**      **Administering Organisation:** University of Sydney

**Project:** "Biomedical imaging with spins in nanoparticles: from single cell to whole-body scanning," by Dr DJ Reilly; **Dr JR Rabeau; Prof Dr A Krueger**

**Awarded 2010:** \$200,000; **2011:** \$195,000; **2012:** \$205,000.

**Project Summary:** The engineering of new biomedical technology is critical in underpinning our understanding of physiology and in the early detection of disease. This project will construct novel instrumentation for investigating normal and diseased physiology using bioagents based on diamond and ruby nanoparticles. The imaging and tracking techniques proposed are non-invasive, nontoxic, and provide high-resolution access to specific physiological interactions of paramount importance in, for instance, understanding cancer pathways and developing strategies for targeted drug delivery.

**LP1000100312**      **Administering Organisation:** Macquarie University

**Project:** "Integrated photonics for secure communication and related applications in financial transaction data analysis," by **Prof DM Kane, Prof PD Smith, Dr RJ Carman, Prof C Jagadish, Dr Lan Fu**

**Awarded 2010:** \$180,000; **2011:** \$190,000; **2012:** \$230,000.

**Partner Organisation:** Arq Indigo Research and Development Pty Ltd

**Project Summary:** The project includes excellent basic science, semiconductor device fabrication and applied mathematics with explicitly identified consequences for innovation. There is strong potential for national economic benefits through the manufacture of new integrated photonic devices, the application of these devices in secure communication systems, the research of advanced non-linear analysis protocols, and the implementation of these in financial transaction analysis. Professional development and research education of postgraduate students and early career researchers will be carried out in a multi-disciplinary research environment with ongoing uptake of the research in industry & commercial sectors.

**LP1000100256 Administering Organisation:** Macquarie University  
**Project:** "Integrated energy conversion and management systems in silicon-on-sapphire,"  
by **Prof GE Town**; Prof NH Weste  
**Awarded 2010:** \$119,661; **2011:** \$109,339; **2012:** \$111,000.

**Partner Organisation:** Sapphicon Semiconductor Pty Ltd

**Project Summary:** The aim of this research is to develop specialised "power-supply-on-a-chip" integrated circuits (ICs) for efficient conversion and management of electrical energy. The project will utilise and develop the unique local expertise and IC fabrication capability in silicon-on-sapphire technology in partnership with Sapphicon Semiconductor Pty Ltd. The ICs developed will be used to improve the performance of small-scale electric power and transport systems based on alternative energy sources, thereby assisting energy self-sufficiency in rural and remote communities and reducing Australia's dependence on fossil and other non-renewable fuels. Sales of the ICs will also generate export income for Australian industry.

We also congratulate our Physics colleague, **A/Prof Gavin Brennen**, whose ARC project DP1094758 on "Topological order and anyons: quantum engineering of emergent physics" will attract ~\$100k p.a. in 2010–12. And let's not forget *MQ Photonics*'s recent outstanding success (as previously reported – *Newsletter*, issue 23) in attracting two ARC Future Fellowships, awarded to our colleagues **Jim Rabeau** and **Richard Mildren**. See: [www.arc.gov.au/ncgp/futurefel/ft\\_outcomes.htm](http://www.arc.gov.au/ncgp/futurefel/ft_outcomes.htm).

**STOP PRESS #1:** *It has just been announced that Dr Russell Connally has been awarded a Macquarie University Vice Chancellor's Innovation Fellowship – the fourth in MQ Photonics. Well done, Russell!*

**STOP PRESS #2:** *Last week Dr James Rabeau received a Young Tall Poppy Award (1 of 4 outstanding Macquarie U scientists out of a total of 18 such awards in NSW/ACT). The Young Tall Poppy Awards, now in their 10th year, recognise high achievers at an early stage of their career who are making major breakthroughs in science. Congratulations, Jim! (See 'News' on our Faculty Home Page.)*

## Official Launch of the Institute for Photonics & Advanced Sensing at U of Adelaide

On Friday 13 November, the University of Adelaide will officially launch its new Institute for Photonics & Advanced Sensing (IPAS), directed by Prof. Tanya Monro. U of Adelaide has invested in this elite research Institute "to bring together its finest researchers to tackle the greatest challenges facing Australia and the world." IPAS "brings together physicists, chemists and biologists to pursue a new trans-disciplinary approach to science. Their aim is "to develop photonics, sensing and measurement technologies that will change the way science is done within traditional discipline areas, stimulate the creation of new industries, and inspire a new generation of scientists to be engaged in solving real-world problems. IPAS research targets applications in Defence and national security, environmental monitoring, preventative health and food & wine." Our *MQ Photonics* colleague David Coutts will represent us at the IPAS launch. I have assured Tanya Monro that we in *MQ Photonics* wish her new institute well and look forward to ongoing interactions with IPAS.

Brian Orr

## NCRIS / ANFF / Optofab news ...



The *Optofab Node* of the *Australian National Fabrication Facility Limited (ANFFL)* is part of the NCRIS initiative, combining activities at Macquarie University, University of Sydney/Bandwidth Foundry International (BFI), and University of Adelaide. It is committed to micro-fabrication of optical components and optical materials. Optofab has built a strong user

base, with a diverse range of services including photolithography, lithographic masks, THz detector arrays, wavefront sensor masks, periodically poled lithium niobate, glass, tapered and specialty optical fibres. In the period 2008–9, Optofab processed jobs for 168 ANFFL users. Optofab is developing *four new micro-fabrication themes* aimed at transforming Australian science. These are: (i) ultrafast laser microfabrication, (ii) functional nano-particle fabrication and micro-assembly, (iii) integrated nano-photonics, and (iv) surface functionalised optical materials and fibres. Major new facilities based on these four themes, to be funded *via* ANFFL under the *Super Science – Education Infrastructure Fund (EIF)*, will enable breakthrough research in key areas such as biomedicine, photonics, astrophotonics, plasmonics, optical quantum science and miniaturisation engineering. *Macquarie University has been allocated ~\$3.5 million of EIF funding* to build facilities associated with the above-mentioned themes (i) and (ii) in the period 2009–13. We anticipate additional strong NSW State Government funding contributing to salaries associated with these facilities.

Michael Withford

## Fresh vistas

### Research funding opportunities – internal schemes

- MQ Safety Net Scheme (MQSN) – after ARC and NHMRC results ... to be advised
- MQ Research Innovation Fund (MQRIF) ... to be advised

### Research funding opportunities – external schemes

- ARC Linkage Projects (Round 2) for funding commencing July 2010 MQ RO deadline: Mon 9 Nov
- ARC Australian Laureate Fellowships for funding commencing in 2010 MQ RO deadline: Wed 18 Nov
- ARC Centres of Excellence, 2011–... ; Expressions of Interest ... MQ RO deadline: Wed 18 Nov

Upcoming conferences in late November & early December (a busy time for *MQ Photonics!*) ...



More information: <http://www.physics.mq.edu.au/research/fluoronet/LILS09/>



More information: <http://www.physics.usyd.edu.au/OSA> (OSA Student Chapter Conference)



More information: <http://www.plevin.com.au/acoftacols2009/>

The full ACOLS/ACOPT 09 program is now at <http://www.plevin.com.au/acoftacols2009/Program.pdf>  
MQ Photonics members will present 1 keynote talk (Nem Jovanovich et al., 'Functionalizing fibre lasers by exploiting direct written fibre Bragg gratings'), at least 12 regular talks and at least 4 poster papers.

... and another upcoming international conference in Sydney (22–26 February 2010):



2010 International Conference on Nanoscience and Nanotechnology

Deb Kane advises that paper acceptances are now released. More info: <http://www.ausnano.net/iconn2010/>

## Publications

A recently published high-impact cover article:

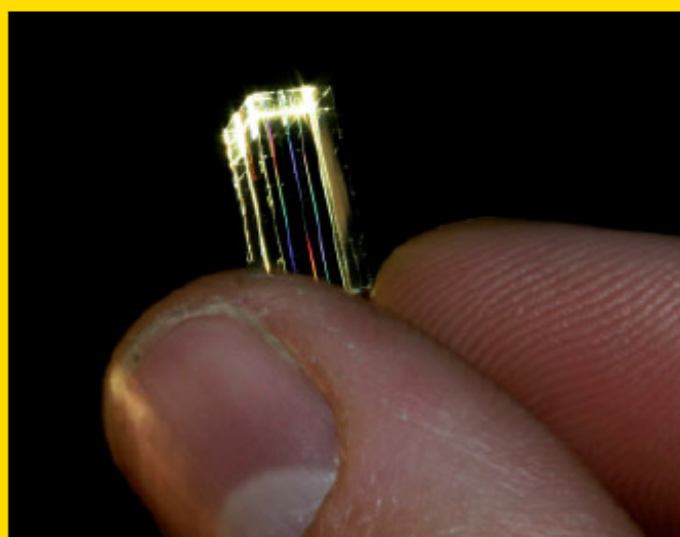
M.Ams, G.D.Marshall, P.Dekker, J.A.Piper, M.J.Withford, "Ultrafast laser written active devices," *Laser & Photonics Review* 3 (6), 535–544 (2009) / DOI 10.1002/lpor.200810050

... a nice review of some of CUDOS@MQ's major progress (impact factor = 4.36)



**Abstract** Direct-write optical waveguide device fabrication is probably the most widely studied application of femtosecond laser micromachining in transparent dielectrics at the present time. Devices such as buried waveguides, power splitters, couplers, gratings, optical amplifiers and laser oscillators have all been demonstrated. This paper reviews the application of the femtosecond laser direct-write technique to the fabrication of active waveguide devices in bulk glass materials.

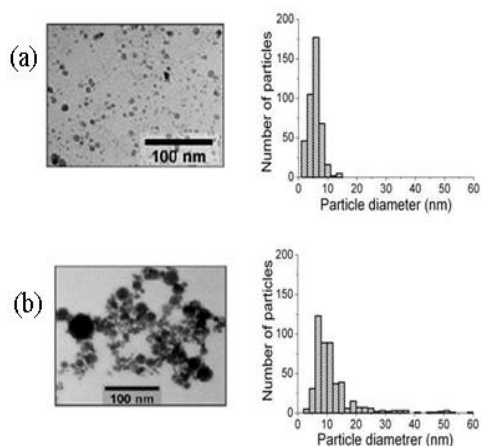
White light diffraction from waveguide Bragg gratings fabricated in doped phosphate glass using the femtosecond laser direct-write technique. Such a waveguide Bragg grating was instrumental to the first demonstration of a monolithic waveguide laser using this technique.



## Recently accepted / in-press articles:

M.Sobhan, M.Withford, E.M.Goldys, "Enhanced stability of gold colloids produced by femtosecond laser synthesis in aqueous solution of CTAB", accepted on 2 November 2009 by *Langmuir* (impact factor = 4.10)

**Abstract:** Femtosecond laser ablation of gold in an aqueous solution of cetyl trimethylammonium bromide (CTAB) is shown to produce nanoparticle suspensions with superior colloidal stability compared to other surfactants, with shelf lives exceeding 2 months even at low concentrations of CTAB, below 1 mM. CTAB also helps control nanoparticle size with mean diameters of 6.3, 5.6 and 4.7 nm obtained in 0.1, 0.5 and 1mM concentrations of CTAB respectively, compared to 11.9 nm obtained in pure deionized water under same ablation conditions. The size distributions produced with low concentrations of CTAB are comparable to those produced by other surfactants, typically used at high concentrations.

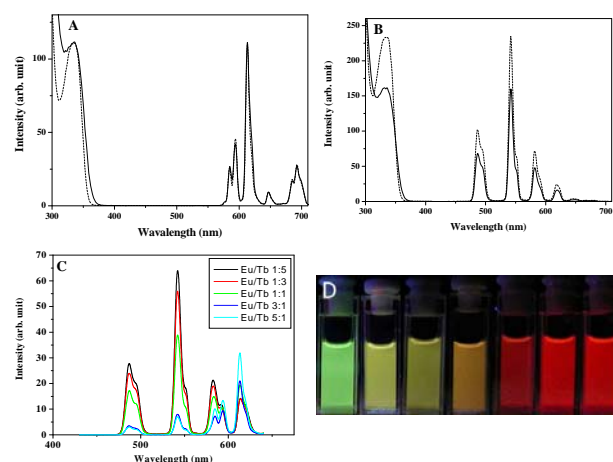


**Fig. 1:** TEM image and corresponding size distribution of gold nanoparticles prepared by femtosecond laser ablation in (a) 0.5mM CTAB and (b) pure deionized water.

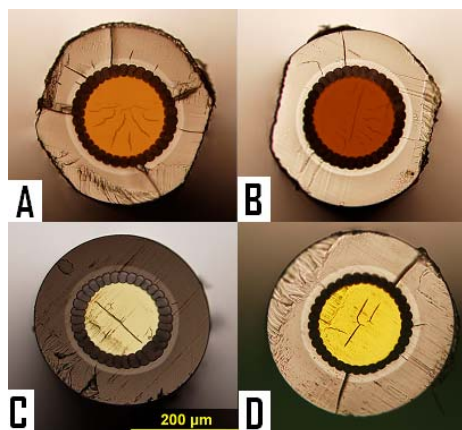
H Jiang, G Wang, X Liu, W Zhang, Z Ye, **D Jin**, J Yuan, Z Liu, "Preparation and time-resolved fluorescence bioassay application of multicolor fluorescent lanthanide nanoparticles," *J Fluorescence*, accepted October 2009 (*impact factor* = 1.88)

**Abstract:** The multi-color time-resolved fluorescence bioassays based on microsecond lifetime lanthanide compounds have been rarely investigated, because there are only  $\text{Eu}^{3+}$  (red  $615 \pm 10$  nm) and  $\text{Tb}^{3+}$  (green,  $545 \pm 10$  nm) compounds emitting strong fluorescence. In this work, we report a series of silica nanoparticle biolabels emitting green, yellow, orange and red colors with an excitation peak at 335 nm. The new biolabels have been prepared by co-binding different molar ratios of fluorescent  $\text{Eu}^{3+}$ - $\text{Tb}^{3+}$  complexes with a ligand N,N,N',N'-((4'-phenyl-2,2':6',2''-terpyridine-6,6''-diyl) bis(methylenitrilo) tetrakis (acetic acid) inside the silica nanoparticles. The nanoparticles characterized by transmission electron microscopy and fluorescence spectroscopy methods were used for streptavidin labeling, and time-resolved fluoro-immunoassay of human prostate-specific antigen (PSA) as well as time-resolved fluorescence imaging detection of an environmental pathogen, *Giardia lamblia*. The results demonstrated the utility of the new multicolor fluorescent nanoparticles for time-resolved fluorescence bioassays.

**Fig. 2.** Time-resolved excitation and emission spectra of (A) the PTTA- $\text{Eu}^{3+}$ -nanoparticles (solid lines) and free PTTA- $\text{Eu}^{3+}$  complex (dash lines) and (B) the PTTA- $\text{Tb}^{3+}$ -nanoparticles (solid lines) and free PTTA- $\text{Tb}^{3+}$  complex (dash lines) in 0.05 M Tris-HCl buffer of pH 7.8. (C) Emission spectra of the nanoparticles prepared with different molar ratios of PTTA- $\text{Eu}^{3+}$ /PTTA- $\text{Tb}^{3+}$  complexes. (D) Emission color images of the nanoparticles prepared with different molar ratios of PTTA- $\text{Eu}^{3+}$ /PTTA- $\text{Tb}^{3+}$  complexes in aqueous solution under irradiation of a 365 nm UV lamp (from left to right,  $\text{Eu}^{3+}$ : $\text{Tb}^{3+}$  = 0:1, 1:5, 1:3, 1:1, 3:1, 5:1, 1:0).



H C Y Yu, A Argyros, S G Leon-Saval, **A Fuerbach**, A Efimov, G Barton, "Emission properties of quantum dots in polymer optical fibres", *Optics Express*, accepted 20th October 2009 (*impact factor* = 3.88)



**Abstract:** CdSe/ZnS core-shell quantum dots have been embedded within microstructured polymer optical fibres. The emission properties of quantum dots within fibres have been explored to show that variation in concentration, sample length & pumping regimes effects the emission characteristics of these quantum dots.

**Fig. 3.** QD-doped, high NA fibres. (A) 620 nm emission QD at 0.0145 wt%; (B) 620 nm emission QD at 0.025 wt%; (C) 520 nm emission QD at 0.1 wt%; (D) 520 nm emission QD at 0.2 wt%. The cracks are due to the fibre cleaving process and do not traverse the length of the fibre.

### MQ Photonics seminars:

Time: 11am, Mon 2<sup>nd</sup> November Place: C5C 498 **Prof. Yasutake Ohishi**, Research Center for Advanced Photon Technology, Toyota Technological Institute, Japan

TOPIC: **New fiber material research for lightwave processing**

**ABSTRACT:** Many efforts have been devoted to materials development and design for optical fibers, waveguide devices, fiber lasers and amplifiers to meet the demands of present and future telecommunication systems. Among non-silica glasses, such as heavy metal oxide and non-oxide glasses, tellurite glasses are promising materials for photonic applications, as they combine (i) a wide transmission window, (ii) good glass stability and durability, (iii) high refractive index, (iv) increased nonlinear optical properties, and (v) relatively low phonon energies. We have focused on research of tellurite fibers, covering research of new fiber material, waveguide structures and applications, as optical signal processing devices. I will present a new prospect of tellurite fibers for lightwave processing including Raman and Brillouin amplification, and broadband light source.

Time: TBA, Thur 12<sup>th</sup> November Place: TBA

**Dr. Ir. Herman L. Offerhaus**

Optical Sciences group, MESA Institute for  
NanoTechnology, Faculty of Applied Sciences,  
University of Twente, Enschede, The Netherlands

**TOPIC: Vibrational phase contrast imaging**

**ABSTRACT:** Coherent Anti-Stokes Raman Scattering (CARS), that phase is probed and the detected CARS signal carries the phase-response of the excited medium. Detection of this phase allows for two exciting new possibilities: first, it allows for the rejection of any non/resonant components, greatly enhancing the sensitivity of CARS microscopy. Second it allows for the simultaneous imaging of multiple substances that have overlapping resonances. Where these overlapping resonances would ordinarily constitute a problem due to indistinguishable (amplitude) effects, the phase of the different compounds now allows for their separation. The identification is based on identifying regions in the complex plane, defined by an amplitude and a phase, that belong to each substance. Mixtures or reaction products can also be identified by their position in the complex plane between unmixed compounds or the reaction start- and end-products. I will present our phase-preserving chain that allows for the identification of the CARS phase and our latest results where we apply CARS measurements to drug dissolution, bone growth and demonstrate the multiple-compound analysis.

Time: 11am, Fri 13<sup>th</sup> November Place: TBA

**Tom Lawson**

**TOPIC: Effect of ionizing radiation on the viability and antibody affinity of *Staphylococcus aureus***

**ABSTRACT:** To test the effect of ionizing radiation on the microbial viability and antibody affinity of subtypes of *Staphylococcus aureus* (SA). Experimental: SA and community-associated methicillin resistant *Staphylococcus aureus* (CA-MRSA) were passaged and subjected to ionizing radiation from a Cobalt-60 (<sup>60</sup>Co)  $\gamma$ -ray source and then labeled with a Fluorescein (FITC) immunoconjugate using a slide-based assay. Viability was measured by re-passaging the ionized isolates. Antibody affinity of SA was measured using fluorescence microscopy. Results: All isolates lost viability after 1 kGy of radiation. A dosage of 1 kGy reduced fluorescence by +/-1%. On average, fluorescence was best with zero radiation dose and diminished as the dosage increased. Doses of more than 10 kGy caused degradation in fluorescence and microscopy resolution of the SA. Conclusion: Ionizing radiation can abrogate viability of SA without significantly effecting antigenicity.

**MQ Photonics conference practice talks:**

All *MQ Photonics* members should now be thinking actively about presenting their *conference practice talk(s) for LILS, KOALA and/or ACOLS/ACOPT* in the weeks commencing 16 and 23 November.

*... and thanks to Dr Alex Fuerbach for  
organising our MQ Photonics seminars:*



**Physics colloquium:**

Time: 12 noon, Wed 4 November Place: C5C 498  
**TODAY!**

**Dr Craig O'Neill**, Department of Earth and Planetary  
Sciences, Macquarie University

**Note: This talk about geophysics has been facilitated by Mike Steel and will be of interest to MQ Photonics**

**TOPIC: Catastrophic overturn and the origin of the south pole thermal anomaly on Enceladus**

**ABSTRACT:** The geologically active satellite Enceladus is enigmatic in that its south polar region exhibits high heat flows and geysers not seen elsewhere on the satellite; its heavily-deformed surface exhibits an episodic age distribution; and the current observed heat loss exceeds the long-term tidal equilibrium heat production by a factor of at least 3.5. Here we show that all three observations may be explained if the ice shell of Enceladus is in a convective regime which involves occasional catastrophic overturns, during which portions of the rigid ice lid are recycled into the interior, causing transiently enhanced heat loss. Model results demonstrate that Enceladus is likely in this episodic regime, assuming a low friction coefficient for the brittle ice shell. The localized nature, periodicity and anomalous heat flow associated with overturn episodes are consistent with Enceladus' geology and energy supply. Localized, catastrophic overturns may also explain the episodic partial resurfacing events that have been inferred for other satellites, such as Ganymede, Rhea and Miranda.

## People and Progress

### **MQ Photonics in celebration mode ...**

Last Friday (30 October) our roving photographer Jin Dayong captured some of us at the U@MQ bar, celebrating Luke Stewart's new job with Finisar Australia, Doug Little's impending marriage, two birthdays (Tim Kelf and Jipeng Lin) and some forthcoming overseas trips (Jin himself, Rich Mildren, Jim Piper ...). Not that a particular reason is ever really needed for such a gathering!



### **Visit this week by A/Prof. David Lancaster ...**

Earlier this year, David Lancaster (one of our alumni – already well known to many of us) was offered an Honorary Associate appointment in our Department of Physics & Engineering. He is spending this week with us on that basis –welcome, David!

David Lancaster has a BSc (Hons I, Physics) from UNSW and a PhD in laser physics from Macquarie University (supervised by Judith Dawes, 1992–97). After 3 yrs as Research Fellow at Rice University (Houston, Texas), in 2000 he became a Research Scientist at the Defence Science & Technology Organisation (DSTO) Adelaide.



At DSTO, David's research interests have included solid-state lasers, fibre lasers, frequency conversion and directed infrared countermeasures. He leads a team of six researchers developing these technology areas as well as maintaining research publication output. Early in 2008, David also took up a role as Adjunct Associate Professor at Adelaide University, to develop collaborative links between DSTO and the U of A's Centre of Expertise in Photonics (COEP). His research areas in COEP are fluoride micro-structured optical fibres and development of rare-earth-doped non-silicate fibre lasers operating in the mid-infrared. David has ~25 refereed publications, and in the last 8 years >30 conference papers. As in the past, we appreciate David's continued collaborations with several members of *MQ Photonics*.

Brian Orr



### **Scott Allan wins Fellowship in Fusion Research at Culham (UKAEA)**

Scott Allan has won a prestigious Fusion Research Fellowship to work on high temperature plasma diagnostics at the United Kingdom Atomic Energy Authority (UKAEA) Culham laboratory in Abingdon. Only two such fellowships are awarded each year internationally. UKAEA is at the forefront of research into nuclear fusion, with its strategic potential as a long term, environmentally friendly energy source for future generations, as well as its wide-ranging science. Culham Science Centre is home to the Mega Amp Spherical Tokamak (MAST), a world-leading device supporting the next generation of fusion machines, and hosts the Joint European Torus (JET), Europe's flagship fusion experiment. In addition to leading edge experiments on MAST and JET, there is a wide ranging programme covering theory and modelling of plasmas and materials, design of systems for ITER, fusion technology, safety and socio economics. Since completing his BSc at Macquarie and PhD at U.Sydney, Scott has been working on the ARC-funded Linkage Project at Macquarie on remote plasma diagnostics for GaN film growth (MQ/ANU/BluGlass Ltd). We wish Scott every success in his new role at Culham laboratory.

Robert Carman



## AIP Postgraduate Award nominee – Eduardo Granados

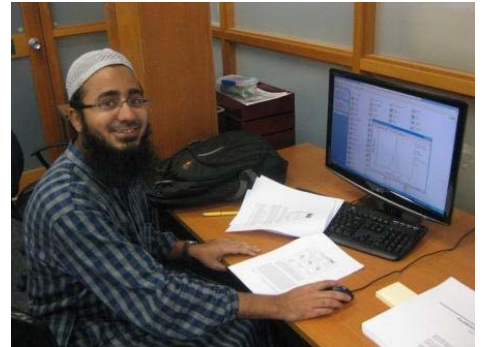
As announced in the previous issue, PhD student **Eduardo Granados** has been selected to represent the Dept. of Physics & Engineering at the forthcoming *Australian Institute of Physics's AIP Postgraduate Awards* on 24 November. With this in mind, he will be one of the invited speakers at our Showcase Day on 20 November.

Brian Orr

## Welcome to Faraz Ahmed

Faraz has now been around for a while, but I've only just got around to getting a photo done. Faraz will be working with Mike Steel and I on enhanced emission from colour centres in diamond using plasmons and cavities. Already Faraz is doing some excellent work and showing great promise, including both experimental work and learning some of the finer points of RSoft with our local guru Mike. In my opinion, RSoft IS Hard. We should look forward to a seminar in early 2010.

James Rabeau



## Macquarie University OSA Student Chapter (A bumper report covering 12 months! – BJO)

### Mini Soccer Tournament

The inter-year, inter-departmental soccer tournament was held by the Macquarie University OSA Student Chapter on a recent sunny afternoon (Fri 23 October). With ~35 players, 7 teams comprising undergraduates, postgraduates and staff battled it out in the "Cantona Kung-Fu Kick" and "Zidane Headbutt" contests. After 3 hours of hotly contested soccer, the first-year undergraduate team ("Team Lance Armstrong") fought off the post-graduate team (name unpublishable) to take home the Ubar voucher prizes.



### Frontiers in Optics, 2009

As the last *Newsletter* was hitting your inboxes, I had just finished attending a Student Leadership Meeting, held by the OSA as part of their Frontiers in Optics conference and situated in San Jose. Each year, one representative of each student Chapter across the globe is invited to attend the Leadership Meeting where Chapter members discuss successful projects and activities.

### Plans for LaserFest 2010

At the San Jose meeting, Barbara Hutchison from the LaserFest committee delivered the news that they would be funding a variety of pre-approved Chapter activities as part of the celebrations of 50 years of the laser. One of these, a laser maze, had already been suggested as the Macquarie University OSA Student Chapter's contribution to Macquarie University's LaserFest activities. However, when I delivered the LaserFest activity details to the Chapter members on my return, it was clear that a second project was also popular – laser graffiti. A video demonstrating laser graffiti is shown at <http://bit.ly/sUMIo> and at various other locations on the web. Due to the stunning visual nature of the activity, we hope it will be a strong addition to our LaserFest programme. For each project, LaserFest will (hopefully) be supplying grant money and, in the case of the laser graffiti, an international competition between the Student Chapters will be held that rewards both creativity and YouTube popularity.

### Student optics conference: KOALA 2009

The Macquarie University OSA Student Chapter will co-host this year's student optics conference, Conference on Optics and Laser Applications – KOALA. The programme has already been filled and the plenary speakers confirmed. Philip Stahl from NASA will talk about the James Webb Space Telescope and Joss Bland-Hawthorn about astrophotonics and the "photonic lantern." Judging by the success of KOALA 2008 and the number of delegates now signed, KOALA 2009 will be going from strength to strength.

## **Annual Progress Report, 2008/9**

Since its establishment in December 2008, the Macquarie University OSA Student Chapter has enjoyed a full and wide-ranging calendar of events. With the goal of encouraging the study of optics in both post- and under-graduate students, the Chapter has held a plethora of events ranging from pizza sessions to barbecues and soccer tournaments to optics-themed trivia nights. The Chapter was initiated by Physics PhD student, Nemanja Jovanovic, towards the end of 2008. The Chapter was founded with a bare minimum 4 members, but membership rapidly reached double figures and we now have 18 active postgraduate student members and one staff overseer, Mick Withford.

In order to promote the study of optics, the Chapter holds numerous events where undergraduate science students can meet the Chapter postgraduates. These occasions are mostly informal and well catered for – the OSA provides a generous budget for Chapters hosting such events. In addition to informal pizza- or barbecue-based meetings, the Chapter also holds more structured events. Some are very definitely driven at the field of optics research such as optics lecture programmes, lab assistant programmes and lab tours of Macquarie University's research laboratories, University of Sydney facilities, or local optics research companies. Other events have a more social aspect such as the optics-themed trivia night and the recently held inter-departmental, inter-year soccer tournament.

As well as targeting undergraduate students, the Chapter also has a healthy outreach programme. Often joining Judith Dawes, members of the Chapter frequently engage in educational activities with students in New South Wales secondary schools. In addition to presentations about basic optics and communication technologies, the Chapter is a strong proponent of the CUDOS Photonics Simulator for high school students. A flash-based web game, the simulator is a puzzle game which incorporates optical components and waveguides to solve communications problems. The Photonics Simulator is a very valuable tool in conveying the subject of optics to young students.

The Macquarie University OSA Student Chapter will be an active participant in Macquarie University's upcoming LaserFest celebrations. To supplement the Photonics Simulator as an outreach tool and by using grants from the main LaserFest committee in the USA, the Chapter will be launching laser maze and laser graffiti projects. These undertakings will aim to engage people of all ages and interests and provide some education and extremely visual demonstrations of the uses of lasers.

KOALA, a student conference held for the first time in November 2008 and organised by the University of Queensland OSA Student Chapter, was hailed as a huge success by its student delegates and plenary speakers. The conference was organised for students by students, and the talks were a refreshing mix of reports from various fields in optics. The talks were aimed at a postgraduate student audience, making them easier to follow and general enough for everybody to walk away with something learned. The informal and friendly atmosphere that characterised the entire conference made asking questions during talks stress free – even for those students who might not normally do so – and provided a good environment for practicing giving a talk or presenting a poster. The social events presented an opportunity to interact with other student with similar research interests, creating invaluable networks for the future. We now look forward to KOALA 2009 on 23–27 November at University of Sydney (with *MQ Photonics* as one of its sponsors).

Alex Butler