MACQUARIE UNIVERSITY | MQ PHOTONICS RESEARCH CENTRE

# NEWSLETTER

Issue 48 – 04 April 2012

***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> by 9 a.m. on the due date. **Next due date: to be advised**

## Focal Points

I open this issue with an acknowledgement of Mike Steel's hard work directing the Departments contribution to the Excellence in Research Australia 2012 initiative. I believe our metrics look promising and we can be optimistic about another strong rating in the "Optical Physics" category.

Greg Forbes contacted me this week expressing interest in renewing his adjunct status with the Department citing the "bragging rites" this gave him as a motivator. In a similar vein we can brag about his recent success winning an OSA award (see below for more detail).

In the last issue I flagged the fact that Graham Marshall will be relocating to Bristol to start a prestigious Marie Curie Fellowship. I'm equally saddened and delighted to say that Nem Jovanovic will also be embarking on to new career opportunity. Nem has been offered a great postdoctoral position based at the Subaru Telescope, Hawaii. A BBQ – social event is planned for next week (Ben Johnston to confirm) to celebrate their significant contributions to the group.

Finally, we welcome Brian Orr back after his recent stay in hospital. I know many MQ Photonics members were concerned about his health during that period and I pleased to add that Brian assures me he is fighting fit and recovering quickly.

Mick Withford

### Welcome news for one of our Adjunct members...

**Rochester, NY--**The Optical Society of America (OSA) has named Greg Forbes of QED Technologies as the 2012 recipient of the David Richardson Medal for his contributions in aberration theory, propagation, asymmetric optical system design, and manufacturing for aspheres. Each year, OSA presents the David Richardson Medal in recognition of those who have made significant contributions to optical engineering, primarily in the commercial and industrial sector.

Forbes joined QED in September 2000 as a senior scientist and is based in Sydney, Australia. He developed concepts and processes that underpin the company's subaperture polishing and stitching interferometry systems that have contributed to transforming the way high-precision optics are manufactured.

Following his doctorate at the Australian National University, he was a Fulbright Fellow at the Optical Sciences Center (Tucson, 1984), a tenured faculty member of the Institute of Optics (Rochester, 1985–1994), and a Research Professor at Macquarie University (Sydney, 1994–2000).

Through collaborations with graduate students and co-workers, Greg developed efficient, influential schemes for optical system assessment, and global optimization for design. He produced several new concepts in Hamiltonian optics, tailored in part for non-axially symmetric systems; e.g., where surfaces are tilted or decentered. He has also collaborated on the development of unconventional asymptotic methods for wave modeling.

http://www.optoiq.com/articles/2012/03/qeds-greg-forbes-awarded-osas-david-richardson-medal.html

New Journal of Physics
The open-access journal for physics

**Selected by the editors of New Journal of Physics for inclusion in the exclusive 'Highlights of 2011' collection**. Papers are chosen on the basis of referee endorsement, novelty, scientific impact and broadness of appeal

J O Owens, M A Broome, D N Biggerstaff, M E Goggin, A Fedrizzi, T Linjordet, **M Ams**, **G D Marshall**, J Twamley, **M J Withford** and A G White, "Two-photon quantum walks in an elliptical direct-write waveguide array", *New Journal of Physics* 13, 075003 (13pp) (2011)

## Fresh vistas

**Macquarie University Research Development scheme**

Open Date: 14th March 2012
Close Date: 26th April 2012

Note: Clause 3 (Eligibility) of the MQRDG Funding Rules has been updated to make clear to potential applicants who had an MQRDG expire on or before 30 June 2011 that they are eligible to apply in this current round – please refer to Section 3.8.
http://www.research.mq.edu.au/for/researchers/how_to_obtain_research_funding/funding_opportunities/internal

## Conference Reports

**ACMM 22 / APMC 10 / ICONN 2012**
**February 5-9, 2012 Perth, WA Australia**

Research from MQ~Photonics was well represented at the 2012 International Conference on Nanotechnology and Nanoscience, which was held jointly with the 22nd Australian Conference on Microscopy and Microanalysis and the 9th Asian Pacific Microscopy Conference, in February. Two PhD students, Henrique Baltar & Annemarie Nadort; and ECR Douglas Little had their registration to the conferences supported by the Australian Nanotechnology Network. It has become a hallmark of ICONN that there are exceptional plenary and invited speakers. In 2012, the inaugural Cockayne Lecture given by Professor Knut Urban to the joint conferences on "Atomic Resolution Electron Micrscopy" was a particular highlight. Also, the plenaries on "Nanogenerators for self-powered systems and piezotronics for active flexible electronics" by Professor Zhong Lin Wang and "Three dimensional complex plasmonic structures, chirality, coupling and sensing" by Professor Harald Giessen excited the audience. The titles, authors and abstracts of presentations from Macquarie University are reproduced below with presenters in bold.

Deb Kane

Radiative and Non-radiative decay rate of single defects in nanodiamonds for imaging and sensing applications.

**S. Castelletto**

Abstract: Point defects (or colour centres) in bulk diamond are considered to be an outstanding platform for understanding fundamental physics effects, as they are an atomic-like system in the solid state. However, when present in diamond nanoparticles challenging questions arise, associated to the properties of their spontaneous emission related to size, morphology, optical hosting environment and non-radiative emission paths or fluorescence intermittence. Therefore some relevant optical properties linked to single quantum defects in bulk material, do not hold completely at the nano-scale. This is a relevant problem considering the emerging applications in fields such as magnetic field probing and super-resolution imaging. We will discuss some recent results regarding the non-radiative decay rate in nanodiamonds hosting Cr-related centres and the possibility to tailor NV spontaneous emission properties for specific imaging applications.

Imaging spider silks using optical surface profilometry

**D. J. Little, N. Naidoo and D. M. Kane**

Abstract: Certain spider silks of the orb-weaver family were recently found to possess unique optical characteristics. To investigate the substructure of these silks, and help determine the origin of these optical properties, the outer silk layers of a *P. eburnus* radial silk were removed using a proteinase treatment. Optical surface profiles of the silk taken before and after the proteinase treatment, revealed the inner core to consist of two intertwined threads. The effect of removing the outer silk layers on the optical properties of the silk is also discussed.

Optical Characterization of Upconversion Nanoparticles for Biomedical Applications

**A. Nadort, Z. Song**, A. V. Nechaev and **A.V. Zvyagin**

Abstract: Sensitive and specific optical probing of biological tissues is of importance to biomedical applications. We propose imaging of tissue sites tagged with luminescent nanomaterials, upconversion nanoparticles (UCNP), whose optical properties allow tissue imaging under minimized absorption and scattering conditions with autofluorescence background signals almost completely suppressed. We report on the optical characterisation of UCNP to assess their potential for biomedical applications.

TEM of Spider Silk Cross-sections Correlated with their Optical and Mechanical Properties

**N. Naidoo, D. J. Little**, D. Birch, M.E. Herberstein and **D. M. Kane**

Abstract: Spider dragline/structural silk is made of protein macromolecules with outstanding strength and elastic properties. We are proposing that the optical properties of silks and related optical elements of some orb webs are also important. Here we compare structural silk from three species of spider, chosen for their transparent optical property. The silks were examined using transmission electron microscopy (TEM) to provide details of the structural morphology. We observed organisation of the cross-sectional micro- and nano-structure for the silks of two *Argiope* spider species and one *Plebs* species. We found the *Argiope* silks to be similar to previous reports for *Nephila* species. This was in contrast to a less layered composition for *Plebs* silk. The morphological structures are correlated with measurements of the principal refractive indices, and related optical materials characteristics, of the silks, and their mechanical strength and toughness. The results suggest the *Argiope* and *Plebs* spiders have evolved different balances between the mechanical and optical functions of their webs linked to the nano- and micro-structure of the silks.

Nanochannels for Biochemistry: Molecular Separation and Concentration by Nanofluidic Gradient Focussing

**D.W. Inglis**, **E.M. Goldys**, H. Jeong, D.J.E. Harvie, W. Hsu

Abstract: This work discusses novel nanofluidic devices that are capable of separation and concentration in a nanochannel using a conductivity gradient. We show direct visualisation of the ion concentration in our nanochannel, allowing unprecedented validation of necessary simulations, and separation and concentration of two fluorescent proteins. We show how voltage and channel geometry affect the ion concentration (conductivity) gradient, and how these parameters affect protein trapping.

Plasmonic Properties of a Periodic Array of Nanocylinders by a Mirror

H.T.M.C.M. Baltar, **K. Drozdowicz-Tomsia**, and **E.M. Goldys**

Abstract: We studied, theoretically and experimentally, the optical/plasmonic properties of a periodic array of silver nanocylinders over a silver mirror. For lattices as short as 150 nm, we cannot excite propagating surface plasmons, however, the structures presented dipolar and quadrupolar resonances in the range of 350–700 nm due to localised surface plasmons. Changing some parameters of the structure, we achieved linear variations on the positions of those resonant modes. The experimental data matched the simulated data, with some variations that may be associated to differences of parameters between the simulated and the constructed geometries.

FESEM of Radial Spider Silk from the Orb Webs of Australian Spider Species

**N. Naidoo** and **D. M. Kane**

Abstract: Field emission scanning electron microscopy (FESEM) has been used to characterise the radial silks of three species of Australian orb weaving spiders. Significant differences have been observed. We will present the microscopy results. Additionally, we will discuss how FESEM protocols can be developed to differentiate components within a biomaterial sample, like spider silk, that appears homogeneous when using standard protocols for non-destructive imaging. FESEM can emerge as a valuable tool for biomaterials science. Our interest in spider silks is from a photonics perspective. Certain orb webs are constructed of transparent optical materials. We are proposing that these webs need to be evaluated and explored to determine whether optical function has been a component of the evolutionary drivers leading to the biomaterials and forms of the webs, and web elements. The FESEM study is one strand of characterisation of these silks. The integration of the results from a range of experimental and theoretical studies will eventually lead to the bigger question being answered.

Advantages of Contrasting Secondary Ion and Secondary Electron Images for Characterising Micro-optical Samples with Nanoscale Resolution

**D. M. Kane**, R J Chater and D S McPhail

Abstract: Secondary ion (SI) imaging is favoured over secondary electron (SE) imaging of dielectric materials because the problem of charging, leading to poor yield of secondary charged particle emissions, and hence poor image contrast, can be more effectively mitigated for ions than electrons. Here we show, it is nevertheless advantageous to record both the SI and SE image of micro-optical samples in order to optimise their qualitative characterisation. This includes visualising flaws in the glass, following sequential sectioning of the glass using focussed ion beam milling. Contrasting the SI and SE images leads to accurate assignment of all materials used in the sample and its mounting. Not all the materials in the mounted samples show contrast in SI images alone. Also, SE imaging gives higher contrast at sharp features and thus enhances the evaluation of topological detail. The approach of utilising both SI and SE images is illustrated by a study of focussed-ion-beam-milled silica microspheres.

MELBOURNE MATERIALS INSTITUTE

The MMI held a joint symposium with Harvard University on Diamond Photonics from 17-20 January, 2012 at the University of Melbourne, Australia.

Researchers from Macquarie University were invited to present their work at MMI-Harvard Diamond Photonics Symposium 2012 in Melbourne. Presenters from 7 countries and more then 12 universities, research centers and commercial companies attended the conference. Topics ranged from basic NV center science to spintronics, quantum bit registers and memory, and diamond processing and Raman lasers. The program included a couple of high profile talks in key aspects of spintronics (David Awschalom and Jorg Wrachtrup) and one on the latest advances in bionic eye research (Steven Prawer).

From Macquarie talks were given by **Torsten Gaebel** about Size-reduction of nano-diamonds hosting NV entres via air oxidation and **Richard Mildren** about 2-Photon UV Etching of Diamond. At the poster session Macquarie was represented by **Stefania Castelletto**, **Andrew Edmonds**, **Ondrej Kitzler** and **Alexander Sabella**. The small size of the meeting provided an excellent forum. We all had a great time discussing our topics with some of the best scientists in our field.

We also attended a public lecture about progress in spintronic given by David Awschalom and were excited to hear that quantum computers should be available in 10 years! At the end we visited laboratories of Melbourne university with great guidance from Prof Steven Prawer. And while in Melbourne some of us decided to stay over weekend to enjoy the Australian Open.

Ondra Kitzler.

# Seminars

## MQ Photonics Seminars / Visitors

Time / Date: 11am / Fri 30th Mar  Room: E6A 102  Speaker: Dr Benjamin Johnston

Topic: Recent laser micromachinining projects carried out at Optofab; Macquarie's contribution to the Australian National Fabrication Facility

Abstract: Macquarie is the lead institution of the Optofab node of the Australian National Fabrication Facility (ANFF). The main service we have provided to date has been laser micromachining. In this seminar I will review some of the projects we have helped bring to fruitition through this service, ranging from micromachines to debris free marking of Germanium surfaces. I will also briefly report on the current schedule for new equipment and services at Macquarie, made possible by our ANFF contribution.

Time / Date: 11am / Fri 20th Apr  Room: C5C 498  Speakers: Geraldine Marien and Christopher Artlett

Topic: TBA

Time / Date: 11am / Fri 27th Apr  Room: C8A 310  Speaker: Ivan Fernandez-Corbaton and Stefania Castelletto

Topic: TBA

# Publications

## Recently published articles

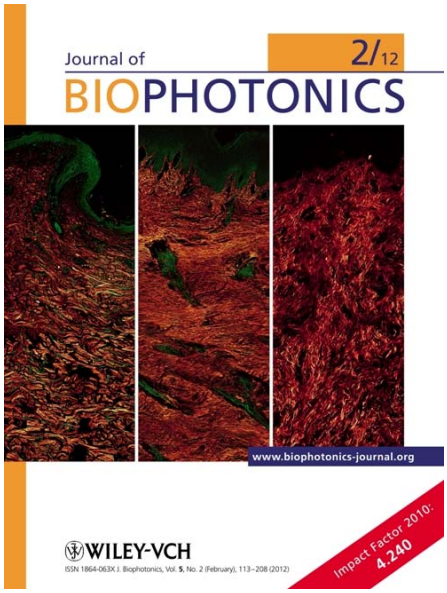



**Image on journal cover – CONGRATULATIONS!**

**T A Kelf**, M E Gosnell, **B Sandnes**, A E Guller, A B Shekhter, **A V Zvyagin**, "Scar Tissue Classification Using Nonlinear Optical Microscopy and Discriminant Analysis", *Journal of Biophotonics* 5(2), 159-167 (2012)

Abstract: This paper addresses scar tissue maturation process that occurs stepwise, and calls for reliable classification. The structure of collagen imaged by nonlinear optical microscopy (NLOM) in post-burn hypertrophic, mature scar, and normal skin biopsies, appeared to distinguish these maturation steps. However, it was a discrimination analysis, demonstrated here, that automated and quantified the scar tissue maturation process. The achieved scar classification accuracy was as high as 96%. The combination of NLOM and discrimination analysis is believed to be instrumental in gaining insight into the scar formation, for express diagnosis of scar and surgery planning.

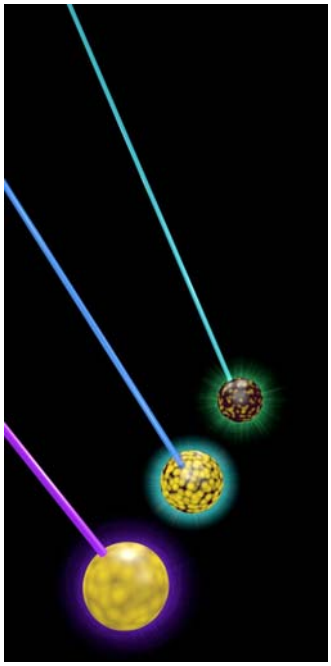


**Image on journal cover - CONGRATULATIONS!**

**E M Goldys**, **M A Sobhan**, "Fluorescence of colloidal gold nanoparticles is controlled by surface adsorbate", *Advanced Functional Materials*, published online: 17 FEB 2012,
DOI: 10.1002/adfm.201102057

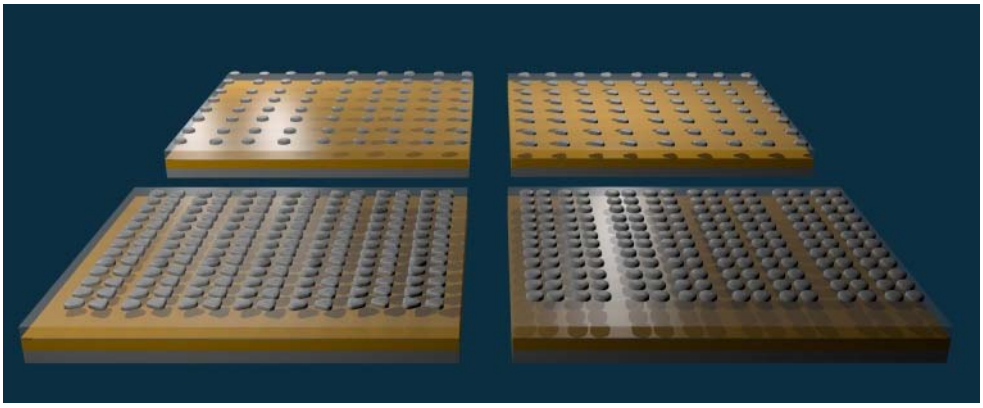
**Abstract** Fluorescent gold nanoparticles are important biological labels, in particular for combined optical and electron microscopy. It is reported that density and type of surface ligands have key influence on the dominant UV-vis fluorescence band in positively and negatively charged gold nanoparticles capped with citrate, gold oxide, and cetyltrimethyl ammonium bromide (CTAB). The peak excitation and emission energies and fluorescence intensities vary with nanoparticle size, reflecting changes in surface charge and surface potential as well as a varying density of surface adsorbates. The fluorescence peak shifts, the evolution of zeta potentials, and fluorescence intensity trends are explained by a model of the principal fluorescence transitions that takes into account the nanoparticle surface conditions, such as the adhesion of ligands. Varying surface ligands is a simple strategy to optimize fluorescence intensity and to design spectral properties of gold nanoparticles.

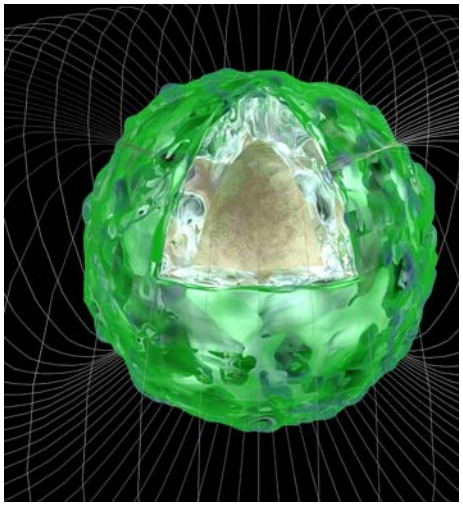
**Image on journal cover - CONGRATULATIONS!**

**K Drozdowicz-Tomsia**, **E M Goldys**, **H Moraes**, "Dense Two-Dimensional Silver Single and Double Nanoparticle Arrays with Plasmonic Response in Wide Spectral Range" *Langmuir*, **DOI:** 10.1021/la300277m

Publication Date (Web): March 22, 2012

Abstract: We report the properties of plasmons in dense planar arrays of silver single and double nanostructures with various geometries fabricated by electron beam lithography (EBL) as a function of their size and spacing. We demonstrate a strong plasmon coupling mechanism due to near-field dipolar interactions between adjacent nanostructures, which produces a major red shift of the localized surface plasmon resonance (LSPR) in silver nanoparticles and leads to strong maximum electric field enhancements. The extinction spectra and maximum electric field enhancements are theoretically modeled by using the Finite Element Method. Our modeling revealed, that strong electric field enhancements of up to 60 in visible range and up to 40 in mid-infrared result from hybridization of multipolar resonances in dense nanostructures, these are important for applications in surface enhanced spectroscopies.





**N Calander, D Jin, E M Goldys**, "Taking Plasmonic Core-Shell Nanoparticles Towards the Laser Threshold", *J. Phys. Chem. C*, DOI: 10.1021/jp2122888 Publication Date (Web): March 9, 2012

**Abstract** The first experimental demonstration of lasing plasmonic nanoparticles in 2009 ignited interest in active plasmonic structures with optical gain. However, the understanding of lasing in plasmonic nanoparticles is largely incomplete, and even less is known about their characteristics as they are taken toward the lasing threshold. Here we present a computational method and predictions of the lasing wavelength and threshold gain for spherical core–shell nanostructures with a metal core and a gain medium in the shell. We demonstrate that light scattering provides a simple diagnostics method to establish how far a specific nanoparticle is from reaching the lasing threshold. We also show that these structures can enhance the electric field by a factor of over 1500 (at 99.9% of threshold gain) and beyond, taking biosensing with these "smart dust" nanoparticles into the single molecule sensitivity regime.

**J Lin, H M Pask, D J Spence**, C J Hamilton, G P A Malcolm, "Continuous-wave VECSEL Raman laser with tunable lime-yellow-orange output", *Optics Express* 20 (5), 5219-5225 (2012)

Abstract: We report a compact CW KGW Raman laser with intracavity nonlinear mixing, pumped by the intracavity field of a VECSEL. By temperature tuning an intracavity LBO crystal, we obtained two separate tunable emissions bands, namely 548.5 - 566 nm for sum-frequencygeneration (SFG) of the fundamental and Stokes wavelengths, and 577.5 - 596 nm for second-harmonic-generation (SHG) of the Stokes wavelength. The maximum output powers for SFG and SHG were 0.8W @ 560nm and 0.52W @ 592.5nm, with corresponding diode-to-visible optical conversion efficiencies of 4.2% and 2.9%. These preliminary results show strong potential for expanding the spectral coverage of VECSEL lasers.

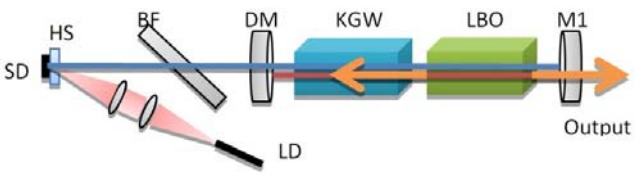



Fig. 1. Schematic of VECSEL pumped CW Raman laser. SD: semiconductor disc; HS: diamond heat-spreader; BF: birefringent filter; DM: dichroic mirror; M1: output coupler.

**G Mariën, N Jovanović, N Cvetojević, R Williams**, R Haynes, **J Lawrence**, Q Parker, **M J Withford**, "Fibre Bragg gratings for high spectral and temporal resolution astronomical observations", *Monthly Notices of the Royal Astronomical Society*, published online: 1 MAR 2012, DOI: 10.1111/j.1365-2966.2012.20592.x

ABSTRACT: Dynamic spectral analysis of astronomical events has the potential to deliver the information needed to clarify or complete important theoretical descriptions of astronomical phenomena. There is currently a lack of detailed sub-minute observations due to limitations in instruments and detectors. Here, we present an investigation into the feasibility of using fibre Bragg gratings (FBGs) as single-line spectral filters specifically for temporal spectral astronomy, attaining both a high spectral and fast temporal resolution simultaneously. We present the device concept and discuss it in the context of two readily available FBG profiles. We demonstrate that this instrument concept could resolve spectral shifts down to 0.02 nm (3.9 km $s^{-1}$) with sub-second temporal resolution on a 4-m class telescope, which is far superior to existing techniques that attain resolutions of 0.05 nm over several minutes.

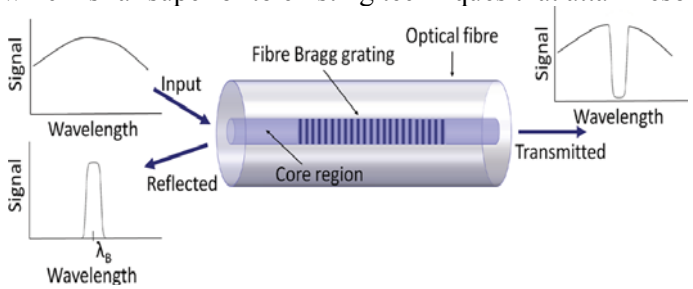
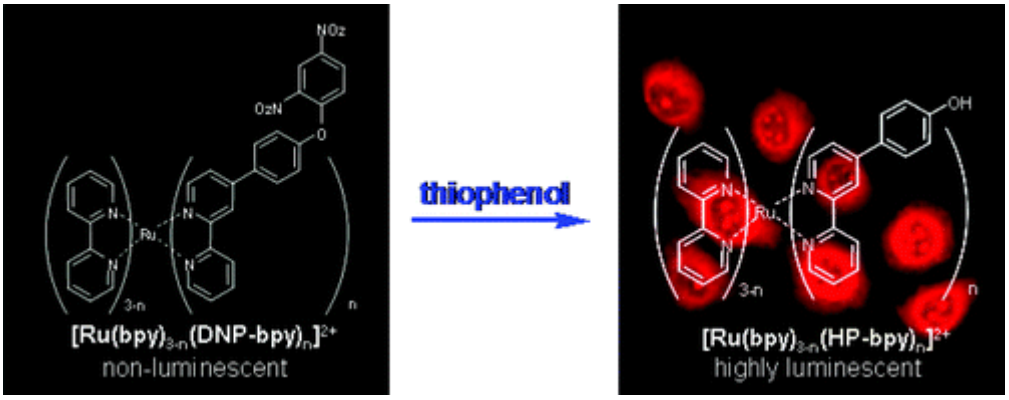



**Figure 1.** Schematic representation of a FBG where a broad-band spectrum is used as input, resulting in a transmitted broad-band output with a notch and a reflected narrow line.

**R Zhang**, Z Q Ye, Y J Yin, G L Wang, **D Jin**, J L Yuan, **J Piper,** "Developing Red-Emissive Ruthenium (II) Complex-Based Luminescent Probes for Cellular Imaging", *Bioconjugate Chemistry,* published online: 21 MAR 2012, **DOI:** 10.1021/bc200506w,

**Abstract:** Ruthenium(II) complexes have rich photophysical attributes, which enable novel design of responsive luminescence probes to selectively quantify biochemical analytes. In this work, we developed a systematic series of Ru(II)-bipyrindine complex derivatives, [Ru(bpy)3‑n(DNP-bpy)n](PF6)2 (n = 1, 2, 3; bpy, 2,2′-bipyridine; DNP-bpy, 4-(4-(2,4-dinitrophenoxy)phenyl)-2,2′-bipyridine), as luminescent probes for highly selective and sensitive detection of thiophenol in aqueous solutions. The specific reaction between the probes and thiophenol triggers the cleavage of the electron acceptor group, 2,4-dinitrophenyl, eliminating the photoinduced electron transfer (PET) process, so that the luminescence of on-state complexes, [Ru(bpy)3‑n(HP-bpy)n]2+ (n = 1, 2, 3; HP-bpy, 4-(4-hydroxyphenyl)-2,2′-bipyridine), is turned on. We found that the complex [Ru(bpy)(DNP-bpy)2]2+ remarkably enhanced the on-to-off contrast ratio compared to the other two (37.8 compared to 21 and 18.7). This reveals a new strategy to obtain the best Ru(II) complex luminescence probe via the most asymmetric structure. Moreover, we demonstrated the practical utility of the complex as a cell-membrane permeable probe for quantitative luminescence imaging of the dynamic intracellular process of thiophenol in living cells. The results suggest that the new probe could be a very useful tool for luminescence imaging analysis of the toxic thiophenol in intact cells.




## Recently accepted articles

**V K A Sreenivasan**, E J Kim, A K Goodchild, M Connor, **A V Zvyagin**, "Targeting somatostatin receptors using in situ-bioconjugated fluorescent nanoparticles", *Nanomedicine*, accepted 15th March 2012

Structured Abstract:

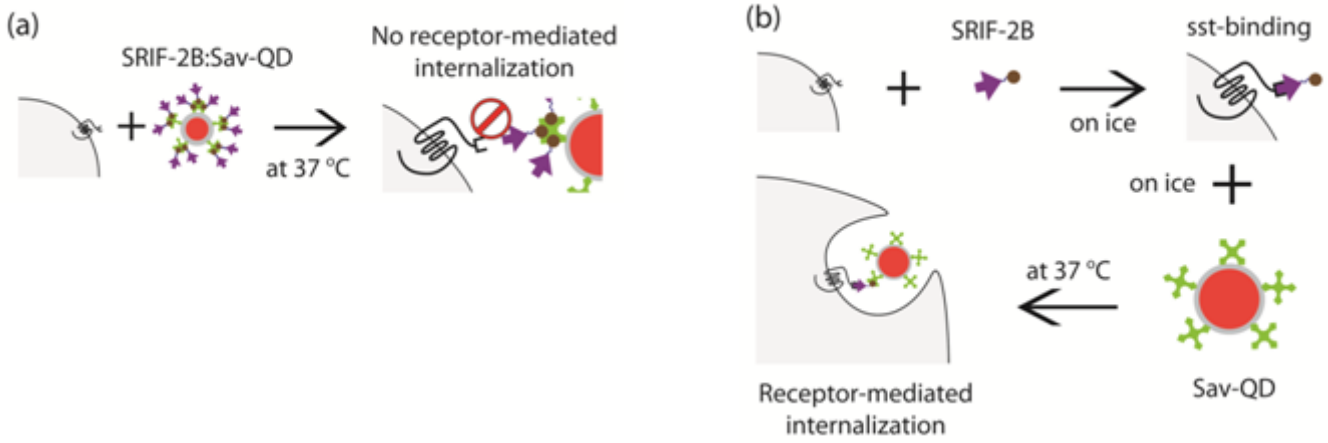
Aim - We report, for the first time, on the development of a quantum dot (QD)-based fluorescent somatostatin (SRIF) probe that enables specific targeting of somatostatin receptors. Receptor-mediated endocytosis of SRIF was imaged using this probe.

Materials & Methods - Biotinylated SRIF-analog (SRIF-B) and streptavidin-coated quantum dots (Sav-QDs) were

used for the probe synthesis. A dye-labeled streptavidin (Sav-dy) complex was used to evaluate the effect of Sav-binding on the activity of SRIF-B.

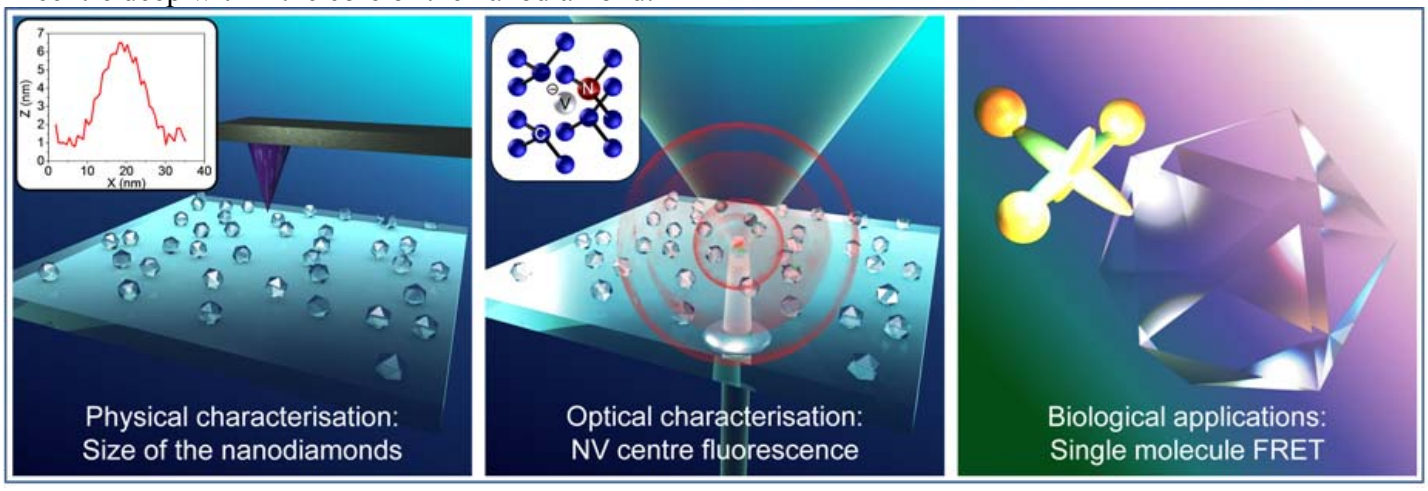
Results - A pre-conjugated probe of the form SRIF-B:Sav-QD‡, was inactive and unable to undergo receptor-mediated endocytosis. An alternative in situ bioconjugation strategy, where SRIF-B and Sav-QD were added in two consecutive steps, enabled visualization of the receptor-mediated endocytosis. The process of Sav-binding appeared to be responsible for the inactivity in the first case.

Conclusion - The in situ two-step bioconjugation strategy allowed QDs to be targeted to somatostatin receptors. This strategy should enable flexible fluorescent tagging of SRIF for investigation of molecular trafficking in cells and targeted delivery in live animals.




**J M Say, C Bradac, T Gaebel, J R Rabeau**, L J Brown, "Processing 15-nm nanodiamonds containing NV centres for single molecule FRET", *Australian Journal of Chemistry*, accepted 23rd March 2012

Abstract: Colour centres in nanodiamonds have many properties such as chemical and physical stability, biocompatibility, straight forward surface functionalisation as well as bright and stable photoluminescence, which make them attractive for biological applications. Here we examine the use of fluorescent nanodiamonds containing a single nitrogen-vacancy (NV) centre, as an alternative nano-label over conventional fluorophores. We describe a series of chemical treatments and air oxidation to reliably produce small (~15-nm) oxidised nanodiamonds suitable for applications in bioscience. We use Förster Resonance Energy Transfer (FRET) to measure the coupling efficiency from a single NV centre in a selected nanodiamond to an IRDye 800CW dye molecule absorbed onto the surface. Our single-molecule FRET analysis, based on fluorescence lifetime measurements, locates the position of the photostable NV centre deep within the core of the nanodiamond.



## People and Progress

Welcome to **Wan Zakiah Wan Ismail**. Zack is currently studying for her PhD titled 'Random laser mechanism based on metallic nanoparticles' under supervision of A/Prof Judith Dawes and Prof. Ewa Goldys. For her PhD area, she will investigate effects of metals in random lasers in terms of lasing threshold, spectral linewidth and emission intensity. Zack has an engineering background, and has completed her Bachelor of Electronics Engineering at Multimedia University and Master in Telecommunication Engineering at Melbourne University.

Judith Dawes

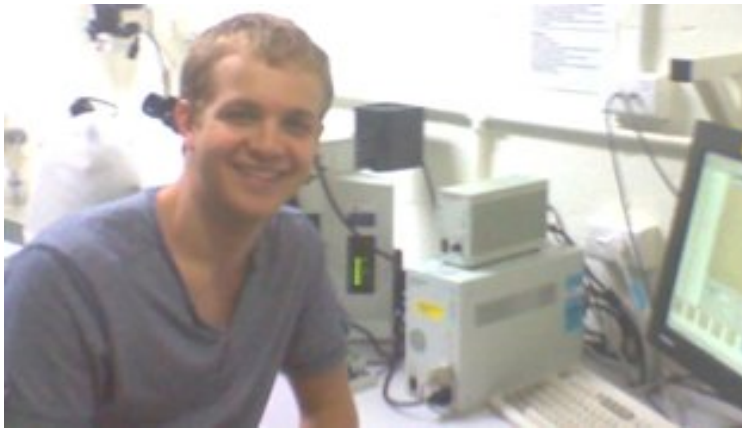
Welcome to **Anita Verinder**. Anita recently started as a part-time Research Administrator bridging the Optofab and CUDOS groups. Anita previously worked for close to 10 years at the MGSM before opting for a change of pace within MQ Photonics. Please make her feel welcome and introduce yourselves to her. She is collocated with me in Room 211, E7A.

Mick Withford

**Vacation Scholars Summer 2012**

The vacation scholarships are ideal ways for younger students to get some valuable hands-on experience and contribute to Centre research. This Summer we had undergrads David Fell and Blake Entwisle who took up 6 week projects during Jan and Feb. David is building on infrared pulsed pump sources for Raman conversion while Blake is developing methods to demonstrate UV-induced carbon desorption from nanodiamonds. Welcome guys.

Richard Mildren



Blake Entwisle

David Fell

## Job Opportunity

**Research Assistant** or **Associate** required: part-time for approx 8 months at 0.4 fraction , available from May.

Project Description:

"Optical sensing of tissue temperature for applications in ophthalmology"

This feasibility study will investigate whether Raman spectroscopy is useful for determining the temperature of vessels in the eye undergoing photocoagulation. Such a capability would be of considerable value because it would enable the surgeon to know when the correct temperature has been reached to achieve the desired clinical effect, and could be combined with retinal imaging for computer-controlled surgery. We will also investigate whether Raman spectroscopy could be used for diagnostic thermometry, in which a scanning laser would be used to map temperatures across the eye

Helen Pask