

**WELCOME** - Welcome to the December 2009 edition of the Australasian Society for Biomaterials & Tissue Engineering (ASBTE) NEWS. In this newsletter you will find information on the upcoming annual ASBTE Conference 2010, as well as society news items including: 2009 travel grant reports; ASBTE Student Column; and laboratory profiles from some of our members. We hope you enjoy reading this newsletter.

## Celebrating 20 years of ASBTE - February 10<sup>th</sup> - 12<sup>th</sup>, Brisbane

We are pleased to announce that the 20th Annual ASBTE Conference will be held in Brisbane, Australia from February 10<sup>th</sup> - 12<sup>th</sup>, 2010. This year's meeting is looking to be very exciting, with abstracts encompassing a broad range of topics and a high level of attendance from our members. For more information please check the conference website for you to view (<http://www.asbte2010.org.au/>).

Please get online to **register** and book accommodation as space is filling up fast. Also, now is a great time to **renew your ASBTE membership** to take advantage of the reduced conference registration fee for members. Further information is available on <http://www.biomaterials.org.au>.

### NOTE: ASBTE 20<sup>th</sup> Annual General Meeting 2010 to be held at the conference venue on February 11<sup>th</sup>.

On the agenda:

- President's, Secretary's, Treasurer's, FASTS Reports
- Website – update
- ASBTE International Travel Grants – update.
- Election of Officers, Committee Members and Student Representatives
- 2011 ASBTE Meeting: Place and timing
- Proposal for an ASBTE Award of Excellence

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20th Annual ASBTE Conference  
Celebrating 20 Years

10th – 12th February 2010  
QUT Gardens Point Campus, Brisbane, Queensland





## 20th Annual ASBTE Conference Celebrating 20 Years

10th – 12th February 2010  
QUT Gardens Point Campus, Brisbane, Queensland

On behalf of the Australasian Society of Biomaterials and Tissue Engineering (ASBTE), we take great pleasure in inviting you to attend our 2010 Annual Conference.

Celebrating 20 years of ASBTE, we encourage you to attend this important event.

### Conference Topics include:

- Tissue Engineering
- Polymers in Tissue Engineering and Drug Delivery
- Stem Cells and Regenerative Medicine
- Biomaterials
- Implantable Devices
- Cell-Material Interactions
- Clinical Applications

The Conference aims to build on the foundations of

previous meetings and will bring together scientists, engineers and clinicians to discuss their latest results. At the same time you may enjoy the opportunity to explore beautiful Brisbane from the ideally located venue right in the heart of the city.

We look forward to welcoming you to Brisbane in February 2010.

Professor Justin Cooper-White  
Co-Chair

Professor Dietmar Hutmacher  
Co-Chair

### Invited International Speakers:



**Professor Jiang Chang**, (*Shanghai Institute of Ceramics, Chinese Academy of Science, China*).

Jiang Chang is the Director of the Biomaterials and Tissue Engineering Research Centre at the Shanghai Institute of Ceramics. His research focuses on bioactive materials for tissue regeneration.



**Associate Professor Li Jun**, (*Division of Bioengineering, NUS, Singapore*)

Li Jun is a research scientist at the Division of Bioengineering at the National University of Singapore (NUS). His research areas cover Biomaterials for drug/gene delivery and tissue engineering, Supramolecular chemistry and molecular recognition, and Polymer synthesis and structural studies.



**Professor Matthias Lutolf**, (*Laboratory of Stem Cell Bioengineering, EPFL, Switzerland*)

Matthias Lutolf is an Assistant Professor within the Faculty of Life Sciences and Institute of Bioengineering at the EPFL. His current research activities interface biomolecular engineering with adult stem cell biology.

The **latest programme** is available on the conference website for you to view ([www.asbte2010.org.au/program.asp](http://www.asbte2010.org.au/program.asp)).

Please get online to **register** ([www.asbte2010.org.au/rego.asp](http://www.asbte2010.org.au/rego.asp))

## Reports from recipients of the ASBTE Travel Award 2009

### Robert Coleman (The University of Queensland)

My project involves the study of biomineralisation processes, particularly the interactions of polyanionic macromolecules with the developing mineral phase. The nature of these interactions has not been conclusively established, thus simpler model polymers, synthesised by the reversible addition and fragmentation transfer (RAFT) method, are to be employed to study the possible interactions. More specifically, acid functionalised polymers with equivalent degrees of polymerisation and low polydispersity will be synthesised such that they vary solely by the functional group (carboxylate, phosphate, sulfate) or the degree of polymerisation. The effects of these well-defined polymers on the growth of hydroxyapatite can then be quantified.

Travel to The University of Sydney was undertaken in order to learn techniques in the synthesis and characterisation of RAFT polymers at the Key Centre for Polymer Colloids (KCPC) under the guidance of Assoc Prof Sebastien Perrier. During this visit, the polymerisation of the monomers hydroxyethyl acrylate (HEA), 2-carboxyethyl acrylate (CEA), and co-polymerisation of these, was performed using the RAFT process. The techniques required for characterising these polymers, namely NMR (to determine the structure of the polymer)

and GPC (to determine the molecular weight and polydispersities) were developed during this time.

It was found that polymers of HEA and CEA could be synthesised with similar molecular weights at approximately 5000 Da. The polydispersities were not found to rise above 1.2, demonstrating that the polymerizations were highly controlled. The polymers synthesised in this work will be tested for their effects on the growth rates of hydroxyapatite using seeded crystal growth studies. The morphologies of the resultant crystals will be analysed to determine whether binding of the polymer to specific surfaces of the crystal results in a change in crystal morphology.

I would like to thank ASBTE for the opportunity to collaborate with leading polymer researchers at KCPC, as the techniques learned during this time will be used throughout the remainder of the project and in future materials research.



### Martin Wallace (University of Canterbury)

During the period of June – August 2009 I was very fortunate to visit the Olfactory Ensheathing Biology Group, at the Eskitis Institute, Griffith University, Brisbane. The main aim of my project is to establish an *in vitro* model for examining guided neurite outgrowth into nerve conduits for the investigation of cellular and chemical therapies for spinal cord injury. The conduits contain longitudinal channels that can be used for the delivery of therapeutic cell populations, such as olfactory ensheathing cells (OECs) and Schwann cells. They are fabricated using inverse moulds which were designed using rapid prototyping. This allows for excellent control over the conduit dimensions, including the size and orientation of the channels. A 2% alginate solution is used to create alginate conduits, by cross-linking with  $\text{CaCl}_2$  while in the inverse moulds.

The main goal of my visit to Griffith University was to gain experience in the isolation and manipulation of OECs, Schwann cells and dorsal root ganglia and optimise seeding of the scaffold. During this period I was also to investigate various carrier matrices that could be used to seed the channels of the model with these cells.

At the Eskitis Institute there are a number of groups working with OECs and Schwann cells. They have produced genetically modified mice expressing the DS-Red gene in OECs and Schwann cells. This allows for the isolation of highly pure populations and easier identification of both cell types. The variety and wealth of

knowledge within the group greatly helped me find new ideas for the project. I was successful in optimising the seeding of conduit channels and produced new designs for the conduit moulds for future experiments. In the initial experiments I investigated the use of collagen, Matrigel and Geltrex for seeding the channels of the conduits with OECs and SCs. The optimal delivery matrix should promote good cell viability, while achieving a uniform distribution of the cells throughout the channels. Both Matrigel and Geltrex allow for good cell viability and conformation while allowing for cell migration within the channels. In my final experiments I began to test the neurogenesis model and achieved neurite outgrowth from DRGs into the channels of the cell-seeded conduits.

I would like to thank Dr Alan Mackay-Sim and Dr James St John for inviting me to visit their group at Eskitis. I would also like to thank Dr Jenny Ekberg and the other members of the Olfactory Ensheathing Biology Group for all their help during my visit. Finally, I would like to thank the ASBTE for help in funding this trip and making this collaboration a possibility.



## Reports from recipients of the ASBTE Travel Award 2009

### Rhiannon Creasey (Flinders University)

Protein aggregation is a significant clinical issue as it can cause a range of diseases, from Alzheimer's disease to type II diabetes and cataracts. Such protein structures can also form a wide variety of natural and artificial structures and materials. Amyloid fibres are already being explored as an advanced nanofibre material; further protein-based investigations could lead to biocompatible materials with the strength and versatility to be used for implant devices, drug delivery agents, cell therapy approaches, and much more. One disease hallmarked by protein aggregation is Pseudoexfoliation syndrome (PEX); this condition is caused by the formation of insoluble protein aggregates in the anterior segment of the eye.

Recently, we and other groups have determined the molecular nature of PEX by proteomic and immunohistochemical analyses. As PEX is a complex aggregation of proteins, the structure at the molecular level is poorly understood. This project addresses the issue of characterising the molecular nature of PEX aggregates on lens capsules in their native state by atomic force microscopy (AFM) based antibody recognition imaging. We collaborated with the laboratory which has pioneered this technique and applied it for the first time to tissue analysis to detect and image the PEX aggregates in their native state on the lens capsule. Three antibodies had been planned for this work; anti-clusterin, anti-LOXL1, and anti-apolipoprotein E as these proteins have been implicated in the PEX pathophysiology. However, due to various limitations (the most prominent of which was time) the only protein investigated was clusterin. This versatile protein is known to be a chaperone molecule; it also has a variety of extracellular functions, many of which aren't yet understood. This protein became the model system upon which proof-of-concept experiments were run, as it is the most convenient to obtain commercially.

Initially, force spectroscopy was used to confirm the probe modification using anti-clusterin against a surface to which clusterin was bound. Several surface chemistries were trialled to ensure the protein was not mobile; eventually, it was proven that the probe tip bound specifically to the protein and could be blocked by the introduction of free proteins.

The modified probes were then used in a picoTREC AFM system on control lens capsules without the PEX disease.

Topography was observed in unison with recognition, and was able to be removed from the images using various methods such as the introduction of free protein to block the antibody. Once clusterin was shown to be present on normal lens capsules, the technique was applied to PEX-affected lens capsules. Some areas of the aggregates were too large to be imaged using the AFM, however smaller aggregates were successfully imaged using both functionalised and non functionalised probes. Clusterin was detected on the surface of the lens capsule and amongst the aggregates – this evidence further implicates this protein in the pathophysiology of PEX. If the chaperone nature of clusterin is the cause of the fibres created in PEX, it could potentially be used for self-assembled fibres of a strong, insoluble and biological nature. With further development, the methodologies which were learnt in Europe are suitable for analysing protein aggregates in a physiological environment. These structures can provide insight to new material development and protein interactions in the body.

A secondary outcome of this project was to reach a more profound understanding of the pathophysiological basis for PEX, so that methods can be developed to screen those at risk of developing PEX-associated glaucoma and losing vision. Improved understanding of the disease can also lead to the development of preventative and treatment strategies in the future. This aim was not achieved; however the proof-of-concept for this technique now means that it will be applied to furthering this aim in the future.

Funding was provided for travel to the University of Linz in Austria to work with the world leaders in AFM antibody recognition imaging and AFM tip modification, Dr Peter Hinterdorfer and Associate Professor Hermann Gruber. A publication is expected following this travel, and is currently being drafted to distribute this technique proof-of-concept and the results obtained from it. ASBTE is to be acknowledged as a funding source for this publication.



### Request for input from ASBTE members

In the past few years a considerable effort has been made to provide support to ASBTE students and early career researchers through either conference travel grants or awards.

The committee is keen to explore options to support the wider membership of the Society. This support might come in the form of the creation of an ASBTE Medal for distinguished service to the Society or to Biomaterials Research in Australia and New Zealand or a travel grant

for non-students or members with restricted access to travel grants.

The committee invites comments on these suggestions and welcomes other proposals designed to increase benefits available to the wider membership. Please send comments/suggestions to Tim Woodfield.

tim.woodfield@otago.ac.nz



### The Office of Laboratories and Scientific Services of the Therapeutic Goods Administration

The Therapeutic Goods Administration (TGA) is the arm of the Australian Government responsible for ensuring that prescription, non-prescription and complementary medicines, and medical devices available in Australia are of acceptable quality, perform as intended (medical devices) and are safe to use. The TGA also has responsibility for ensuring that prescription medicines are effective.

The Office of Laboratories and Scientific Services of the TGA (OLSS - formerly called TGA Laboratories) are located in the award winning TGA complex in Canberra, ACT. The laboratory has an extensive range of state-of-the-art analytical equipment for qualitative and quantitative analysis of therapeutic goods. OLSS staff includes scientists, engineers, technicians and support personnel.

OLSS currently holds accreditation from NATA against ISO 17025-1999 in the fields of Biological Testing, Drug and Pharmaceutical Testing and Physical Testing. In addition, the OLSS is the Official Medicines Control Laboratory for Australia, the National Control Centre in the Asian Pacific Region, a WHO Collaborative Centre for Drug Quality Assurance and a WHO Collaborative Centre for the Quality Control of vaccines and other biological drug products.



#### Structure and Activities

The OLSS has five sections aligned along scientific and technical speciality: Biomaterials and Engineering, Biochemistry, Chemistry, Immunobiology and Microbiology. Each Section has a mix of scientific and technical staff and is headed by a Chief Scientist. A central management team provides administrative support. The activities of each scientific section are basically the same:

**Testing** of products for compliance with regulatory and technical standards

**Investigation** of adverse events, problems and complaints associated with therapeutic products

**Evaluation/Assessment** of technical documentation in relation to pre-market approvals

**Development of Technical and Regulatory Standards** and test methodologies

**Scientific Advice** and input in relation to policy and regulation of products and issues management.

**Audits** of manufacturer facilities and other laboratories (as technical experts)

#### Major Testing Facilities

The OLSS is equipped with a large array of state-of-the-art testing equipment. Some of this equipment includes:

- |                                |  |  |                   |
|--------------------------------|--|--|-------------------|
| -HPLC systems                  | -GC systems  | -GC/MS (ion-trap, quadrupole)                    | -LC/MS (ion-trap) |
| -IR/UV spectrophotometers      | -AA spectrophotometer                                      | -Dissolution                                     | -Genotyping       |
| -Coagulation analyser          | -PCR facilities  | -Capillary electrophoresis                       | -PC2 facilities   |
| -Particle measurement          | -Cell culture facilities                                   | -Cryostage Scanning Electron Microscopy with EDS |                   |
| -Mechanical & Physical Testing | -Electrical and Electronics Testing and patient simulators |  |                   |



By large, testing is targeted and based on market intelligence, adverse events, emerging issues or complaints. However, OLSS also conducts tests to provide regional support (WHO, other government agencies), to maintain accreditation and to develop test methods for Standards and the Pharmacopoeias. The testing programs and priorities are developed in consultation with the relevant TGA Regulatory Program Managers.

#### Medical Device Testing

In theory any one of the OLSS sections may be involved in testing or investigation of any one of the many tens of thousands of therapeutic products available in Australia. But in reality medical devices are primarily investigated and tested in the Biomaterials and Engineering and Microbiology Sections.

Medical devices account for nearly all of the work of the Biomaterials and Engineering Section – and account for approximately a third of the workload of the Microbiology Section.

The sorts of tests that are conducted on medical devices in Microbiology are perhaps self-evident, however this is not the case for the Biomaterials and Engineering Section.

The Biomaterials and Engineering Section (BIOME) has experts in the fields of Biocompatibility, Biomaterials, Biomechanical Engineering, and Biomedical Engineering. The Biomaterials and Engineering Section is also responsible for providing engineering and workshop services to the other sections of the OLSS. The Section evaluates, tests and conducts investigations on medical devices as diverse as infusion pumps, catheters, rubber gloves, condoms, hip implants, wheelchairs, patient hoists, pacemakers and heart assist devices. The tests conducted are mostly mechanical and physical in nature and usually conducted in accordance with the requirements of ISO standards, but we also rely heavily on electrical/electronic performance tests, SEM, microphotography and FTIR. The Section has a tissue culture laboratory which tests medical device materials for cytotoxicity in accordance with ISO 10993-5. The work is varied, interesting, exciting and rewarding especially as one gets a real sense that the work is making a significant contribution to public health and safety.



## Laboratory profile

### *Biomaterials Research Lab at Curtin - Dr Xia Lou*

The Biomaterials Research Group at Curtin University of Technology is lead by Associate Professor Xia Lou of the Department of Chemical Engineering, who is also the Bio-nano Program Leader of the Nanochemistry Research Institute Curtin and a member of the Western Australia Nanochemistry Research Institute.

The group was set-up in 2005 when Xia joined Curtin after her nine years service in the Department of Biomaterials and Polymer Research of Lions Eye Institute Perth. Research is primarily focused on the development of polymeric and nano-materials for biomedical applications including tissue engineering and controlled drug delivery. The group is currently consisting of 1 Post-doctorial Fellow and 5 post graduate students with a very functional research lab located in Curtin's new Chemistry Precinct (see picture below). Each year the group also provides various research projects to several final year and honours students.

The group has gradually established some steady collaboration with local and international researchers in the past few years. These include A/Prof Deirdre Coombe in the School of Biomedical Science Curtin, Professor YiYan Yang of the Institute of Bioengineering and Nanotechnology Singapore, and Professor YuFeng Zheng of the Centre of Biomedical Materials and Engineering in HEU China. The collaborations have resulted in exchange of early career staff and some joint research publications in the past two years. A new post-doc will commence working on a joint tissue engineering project with Coombe and Lou in 2010 through the support of a Curtin Early Career Research Fellowship. Exchange and co-supervision of PhD students with the collaborative research groups are also in arrangement.



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Picture:  
 Front Left to Right: Ailin Ding, Yuli Setiyorini, Yenny Rojas, Xia Lou  
 Back Left to Right: Chao LI, Chi Phan, Elizabeth Grenik, Muhammmad Ridwan Doba

Do you have some exciting new research to report on? Is there a special seminar happening at your institution? Do you have a scholarship to advertise? Well, look no further. Please email any and all newsworthy items to David Nisbet. Any pictures from past ASBTE events would be highly appreciated as well.

[david.nisbet@eng.monash.edu.au](mailto:david.nisbet@eng.monash.edu.au)

# FASTS Federation of Australian Scientific and Technological Societies

**FASTS** is Australia's peak science body, representing over 60 professional societies and 60,000 scientists. You are a member of FASTS through membership of your society. Our professional staff supports you, your society and the Australian scientific community in a range of ways. FASTS seeks the ongoing contribution of your Society to keep science at the forefront of the national agenda.

## **FASTS ongoing contribution to Australian science includes:**

- Science meets Parliament – FASTS' annual flagship event, where more than 200 scientists have face-to-face meetings with Federal Parliamentarians on science issues
- Highlighting science with the Prime Minister and the Cabinet through FASTS' ex-officio membership of PMSEIC
- Organising forums and workshops on significant science issues
- Developing science policy at a high level and providing input to Parliamentary Committees, Government Departments and Government reviews and inquiries
- Distributing information to member Societies regularly and responding to feedback
- Assisting member Societies to raise and develop issues

## **2009 highlights include:**

- Roll out of FASTS Heads Up Program including presentations on Quantum Cryptography, and Emissions Reduction Targets and the Great Barrier Reef
- National roadshow to gather responses to the Government's: Powering Ideas: An Innovation Agenda for the 21st Century
- Presentation to the PMSEIC on Epidemics in a Changing World and contribution to the PMSEIC foresighting committees
- Provision of examples of science success stories from FASTS' members to the Prime Minister
- Launch of major document in Parliament on Women in Science in Australia: Maximising Productivity, Diversity and Innovation
- Release of major reference document When is Science Valid? – a Short Guide on How Science Works and When to believe it
- Formation of the Great Barrier Reef Climate Change Alliance and briefing to politicians, the media and the bureaucracy on the impact of climate change on the GBR
- Release of Policy Discussion Paper: Giving Preparedness a Central Role in Science and Innovation Policy
- Submissions to reviews including ARC Centres of Excellence and NHMRC Fellowship Consultation Paper
- Commissioned a study to investigate the changing nature of scientific and technological work

## **Value to FASTS' Members – Projects for 2010**

- Support FASTS' members in building sustainable societies
- Ongoing action to implement the Women in Science Report
- Contribute to the development of the Federal Government's Research Workforce Strategy
- Ongoing work on the changing nature of scientific and technological work
- Provide FASTS' members with practical resources such as Guidelines to Running Conferences
- Publish a policy document addressing Impediments to Collaboration
- Publish a paper on the Governance of Science
- Investigate links between science education and industry-readiness
- Hold Science meets Parliament on the 9th & 10th of March 2010. Contact FASTS to attend
- Present further briefings under the FASTS Heads Up Program– contact FASTS with your ideas

**For more information and to access the documents above please visit the FASTS' website:**  
[www.fastso.org](http://www.fastso.org)

## **ASBTE Student Column**

### ***Report from the ASBTE Student Reps (Lauren Clements, Donna Menzies & Nick Kirkland)***

Welcome once again to the student column of the ASBTE newsletter. 2009 has almost come to an end, which means that many of our fellow student researchers have been busy in the lab wrapping up final experiments for the year, or for those of you who are nearing submission, trying to get those final corrections from supervisors before they head off on their Christmas holidays.

This year — as you would already know — the ASBTE meeting is being held at QUT in hot and sunny Brisbane. Abstract submission has now closed and we hope to see many fellow students at the conference. This year we will be co-chairing the 5 minute poster presentation session on Day 1, so we would love to see a big turnout to support our fellow students and early-career researchers as they give their presentations.

Similarly to last year, we will be having an informal gathering for all attending students after the conference dinner. This will be held at the Pig 'N' Whistle British pub. For those of you who attended last year's conference, you will know it was a great way of getting to know fellow researchers, both ASBTE members as well as other students who have travelled here for this great event. We hope to see you all there!

Do you have an aspect of your research that you would like to share with fellow students? If so please feel free to let us know your thoughts for the next student column! We, as the student representatives of ASBTE, would like to welcome and encourage research students out there to let us know how your projects are going or if you have any information that you would think fellow colleagues would appreciate.

As one last reminder don't forget to have a look at the student page on the ASBTE website...

<http://www.biomaterials.org.au/index.php?id=9>

We are always interested in hearing fellow students' research interests. Please let us know if there is anything in particular that you would like to see featured on the student page or this column.

Hope to see you all in Brisbane in February!

#### Student Editors:

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Nick Kirkland

### **ASBTE Website ([www.biomaterials.org.au](http://www.biomaterials.org.au))**

Remember, any member wishing to supply news items, links, PhD scholarships, job listings, or other relevant information should submit these to David Nisbet ([david.nisbet@eng.monash.edu.au](mailto:david.nisbet@eng.monash.edu.au)).

**Interested in becoming a member of ASBTE?** Membership Rates: Full Member (Calendar Year) \$60; Student Member (Calendar Year) \$30. Membership forms are available at [www.biomaterials.org.au](http://www.biomaterials.org.au)



**ASBTE NEWS** is a biannual newsletter that covers news from The Australasian Society for Biomaterials & Tissue Engineering. If you have a news item that you wish to be included please contact the editors:

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### **ASBTE Membership 2010**

If you've not updated or renewed your ASBTE membership for 2010, then membership forms are available at the website [www.biomaterials.org.au](http://www.biomaterials.org.au).