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Events & Seminars

2011 5th International
IEEE/EMBS Conference
on Neural Engineering
Cancun, Mexico
27 Apr - 01 May 2011

Pretty Good Guess:
Reflections on Bone
Stiffness
Prof. Clifford Les
Crossland Lecture Theatre,
Parsons Building Trinity
College Dublin
Friday May 20th 2011

ESEM Summer School
Trinity College Dublin
July 10th - 22nd 2011

The 4th International
Conference on the
Mechanics of
Biomaterials and Tissues
(ICMOBT-4)
Hawaii, December 2012

Message from the Director

Firstly, I wish to congratulate Professor Prendergast, Professor of Bioengineering, on being elected 44th Provost of Trinity College Dublin. The Provostship has a term of ten years and we wish him the very best and support him in his vision for leading Trinity College on the world wide platform for Education and Research.

We welcome Dr. Edmund Lalor as a new Principal Investigator to the Trinity Centre for Bioengineering. Dr. Lalor is the Ussher Lecturer in Active Implantable Medical Devices in the School of Engineering, Trinity Centre for Bioengineering and Trinity College Institute of Neuroscience. TCBE now has 19 Principal Investigators in total.

In September 2011 we will welcome seven international students coming for the MSc in Bioengineering. These students will take the new neural engineering specialisation modules. Trinity College is participating in the EU funded CEMACUBE programme providing scholarships to top ranked students to register for a MSc in Bioengineering. Besides neural engineering, specialist modules in Tissue Biomechanics & Regenerative Medicine are available for 2012/2013.

We have received numerous expressions of interest for the Graduate Research Education



Provost-elect, Professor Paddy Prendergast

Programme in Medical Device Design. Applications for the 10 PhD Scholarships are invited for this programme that besides carrying out PhD level research, will provide the skills to enable the researchers to recognise how their research can lead to innovation and the creative design process fundamental to a sustainable Medical Device sector in Ireland. The program commences in September 2011 and contributes to the expanding high-level and distinctive educational offering in TCBE.

Prof Richard Reilly
Director, Trinity Centre for Bioengineering

MSc. in Bioengineering 2009–2010



The M.Sc. Bioengineering class of 2009-2010 had their commencement ceremony on Monday 18th April 2011. Well done to all our graduates.

Pictured here is a selection of the latest class of graduates from MSc in Bioengineering from left to right front row: Ellen Roche, Karen Flannery, Ruth Carson, Aaron O'Reilly; second row: Lewis Rhatigan, Michael Takaza, Wesley Allen, Richard Collier; back row: Dr. Kevin O'Kelly, Deputy Director of TCBE and Prof. Richard Reilly, Course Director of MSc in Bioengineering and Director of TCBE.

Prof. Fergal O'Brien was awarded a Science Foundation Ireland (SFI)/Enterprise Ireland (EI) Joint Technology Innovation Development Award Programme (TIDA). O'Brien FJ (Principal Investigator), O'Gorman D. COLLAqua: Development of a cell and growth factor free naturally-derived osteoinductive bone graft substitute. €48,425: 2011–2012.

Dr. Ciaran Simms finalist in **Irish Times Innovation award** In collaboration with Moorings Mediquip, a medical supplies company based in Antrim, Dr Ciaran Simms was a finalist in the Irish Times Innovation Awards 2011 for the design, development and delivery of a walking aid for children with conditions such as cerebral palsy, enabling many children to take their first and perhaps only steps. This was developed in just over 12 months.

Congratulations to **Alan Power** who successfully recently defended his PhD in Neural Engineering and who has accepted a Postdoctoral position at Cambridge University in their Centre for Neuroscience in Education. Alan will be researching how the brain functions and changes during development of reading and maths. His focus will be on dyslexia.

The 4th International Conference on the Mechanics of Biomaterials and Tissues (ICMOBT-4) will take place in Hawaii in December 2011. David Taylor is one of the conference organisers: 'We have had good representation from TCBE at this conference when it has run previously. It's a smallish conference (200–300 people) very much focussed on the mechanical properties of biomaterials and of biological tissues. There's an impressive line up of keynote speakers'. See the following link for more *details*:

www.mechanicsofbiomaterials.com.

Research Breakthrough: Measuring the Toughness of Insect Cuticle. Jan-Henning Dirks and David Taylor are the only people in the world who know the fracture toughness of insect cuticle. We've just measured it in the legs of locusts. Cuticle is the chitin-based material that insect skeletons are made of: a similar material is used in other arthropods such as crustaceans, so there's a lot of it in the world, but as far as we know, nobody measured its toughness until now. Understanding how toughness is achieved in this material may be useful for the creation of new biomimetic materials, but we just did it out of curiosity!

Congratulations to **David Hoey** who won the award for Outstanding Trainee (Junior Investigator) Presentation at the 4th New York Skeletal Biology and Medicine Meeting with a talk entitled '*A role for the primary cilium in fluid flow-mediated osteogenic differentiation of human mesenchymal stem cells*'. David, a Postdoctoral Fellow in Prof. O'Briens group, has been carrying out research in Prof. Chris Jacobs lab in Columbia University in NYC and will be returning in June.

Congratulations to **Niamh Walsh, 2010 MSc graduate who is going to San Diego.** Niamh recently secured a position with Abbott Vascular in Clonmel and will be working on their Bioresorbable vascular stent/scaffold project, as a quality engineer, in Temecula in San Diego for a year.

FEATURED IN THE PRESS:

Human+: The future of our species

This week in the Irish Times an article on the Human+ exhibition currently running in the Science Gallery, featured an interview with Prof. Richard Reilly, one of the curators of the exhibition:

The Science Gallery is running the Human+ exhibition which looks at the human race and where it is going. Its curators were posed a few interesting questions. Here is Prof Richard Reilly's response to the question 'Are we moving into a future where rather than focusing on rehabilitating those with sensory loss or permanent disabilities, healthy individuals will elect to have invasive surgery to "enhance" themselves or their senses?'

While there have been great advances in the design, control and interfacing of electronic devices that exist inside the body, as exemplified by cochlear and retinal implants, our level of understanding of how our sensory information is acquired, relayed and processed in distinct areas of the brain is still poor. There remain a number of unsolved technical challenges that need to be overcome to really make such implants function to a level approaching that of the biological originals.

Once we get to this level then these sensory implants may become as commonplace as orthopaedic hip implants are for those with mobility problems. As regards sensory enhancement as popularised in science fiction, this is not possible with the strategy employed by current designs in cochlear and retinal implants, which focus on overcoming the damaged input sensory cells in the cochlear or in the retina. One would have to interface directly at higher sensory processing levels in the brain to impact augmentation. However, given our poor understanding of the complex interaction of different brain areas to process sensory information, sensory augmentation is not possible.

Do you think that there is significant potential for disabled people to become the early adopters of human enhancements?

Those with disabilities are just differently abled. Technology has an important role to play in allowing these abilities to be maximised. As a result these individuals tend to be on the frontline with regard to testing of new devices, but are increasingly becoming more involved in the specification and design of diagnostic aids and devices. These include augmentative and alternative communication systems and mobility devices. User centred design is a new approach within the discipline of universal design, which is best practice for product design.

To read the complete article go to <http://www.irishtimes.com/newspaper/bang/2011/0504/1224295991087.html>

Life sciences

The RIA Life Sciences Committee has instituted an occasional series of statements on issues of public interest in the Life Sciences. The Committee hopes to inform and enthuse the general public on various topics such as genetic fingerprinting, functional foods, diet and health, and good/bad fats. The first such statement is entitled 'The Need for Life Sciences in Ireland' and has been written by Professor Alex Evans (UCD). It is the focus of a recent article by Dick Ahlstrom in the Irish Times which features Prof. Clive Lee.

The statement is available here: <http://www.ria.ie/our-work/committees/committees-for-science/life-sciences/policy.aspx>

The article in the Irish Times is available here:

<http://www.irishtimes.com/newspaper/sciencetoday/2011/0217/1224290012084.html>

The 17th Annual Bioengineering in Ireland Conference

Highlights of this year's Bioengineering in Ireland conference (January 2011) included the Haughton Lecture, the Engineers Ireland Biomedical Research Medal for Ph.D. research, and a keynote lecture by Mr. John Power, CEO of Aerogen.

Isabelle Killane, a PhD student of TCBE, attended the 17th BinI Conference in Galway and she gives us the low down on the conference:

"From Friday at 3pm until Saturday at 6pm the seminar rooms of the Ardiluan hotel were buzzing with energy and enthusiasm from novice to expert researcher. A very worthy finalist, Stephen Thorpe, eloquently argued the virtues of "Zonal Cartilaginous Tissues by Modulating the Local Environment Through the Depth of the Developing Construct" but the competition was stiff and Stephen was just piped to the post for the Engineers Ireland Biomedical Research Medal. The latest findings in biomaterials, cardiovascular, cell mechanics and mechanobiology, Orthopaedics, Tissue Engineering and Regenerative Medicine research was the order of the day on Friday with Bioelectronics, Musculoskeletal and Functional Biomechanics also being discussed on Saturday in both large grand stages and more intimate nested rooms. TCBE held its own in each session.

It seems now that the Bini conferences are synonymous with great night time entertainment and BINI 2011 was no exception with Musician Moviestar Quiz night a roaring success and conference dinner and prize giving well planned. We bid farewell to the conference and lovely scenic Salthill on Sunday morning and look forward to another great BinI in 2012 which will take place in Belfast."

NEW RECRUITS



Grainne Cunniffe is a graduate in experimental physics from Trinity College Dublin. She then completed a collaborative PhD between Queen's University Belfast and RCSI under the joint supervision of Dr Glenn Dickson and Prof. Fergal O'Brien. Her thesis was in the area of nano-composite scaffold construction, in-vitro analysis and gene therapy. Grainne's postdoctorate research in RCSI investigated the scaffold-based application of therapeutic genes for bone tissue regeneration.



Simon Carroll is a new PhD student in Dr. Danny Kelly's lab. His research will explore how mechanical forces regulate the structural organization of cartilaginous tissues engineered using mesenchymal stem cells. Simon holds a B.Sc in Mechanical Engineering (Bolton St. DIT) as well as a M.Sc in Bioengineering from TCD. He has worked as a mechanical design engineer for ESBI Ltd and most recently with Boston Scientific, Galway.

Having recently joined Dr. Ciaran Simms group, **Fionn O'Brien**, Research Engineer and **Giuseppina Amato**, Postdoctoral Fellow, have started research on the National Roads Authority project titled "Experimental and numerical characterization of low-cost roadside barrier solutions"

PAPERS AND PUBLICATIONS

Kevin M. Moerman, Andre M. J. Sprengers, Jaap Stoker, Aart J. Nederveen, Ciaran K. Simms, Rolf M. Lamerichs Validation of SPAMM tagged MRI based measurement of 3D soft tissue deformation
http://online.medphys.org/resource/1/mphysa6/v38/i3/p1248_s1?site=mobile

Crosslinking and Mechanical Properties Significantly Influence Cell Attachment, Proliferation, and Migration Within Collagen Glycosaminoglycan Scaffolds
Matthew G. Haugh, B.A., B.A.I., Ph.D., Ciara M. Murphy, B.Sc., Ross C. McKiernan, B.Sc., Cornelia Altenbuchner, M.S., and Fergal J. O'Brien, B.A., B.A.I., Ph.D. TISSUE ENGINEERING: Part A Volume 17, Numbers 9 and 10, 2011 ^a Mary Ann Liebert, Inc. DOI: 10.1089/ten.tea.2010.0590

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Sheehy, E., Buckley, C.T., Kelly, D.J : Chondrocytes and bone marrow derived mesenchymal stem cells undergoing chondrogenesis in agarose hydrogels of solid and channelled architectures respond differentially to dynamic culture conditions, Journal of Tissue Engineering and Regenerative Medicine, In Press.

Nagel, T., Kelly, D.J : The Influence of Fibre Orientation on the Equilibrium Properties of Neutral and Charged Biphasic Tissues, Journal of Biomechanical Engineering, In Press.

Lee T. C : Anatomists and Geometers: 16th Samuel Houghton Lecture of the Royal Academy of Medicine in Ireland, Irish Journal of medical science, In Press.

Power A.J., Lalor E.C., Reilly R.B., "Endogenous Auditory Spatial Attention Modulates Obligatory Sensory Activity in Auditory Cortex" Cerebral Cortex, In Press, doi:10.1093/cercor/bhq233

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C. Wan, B. Chen: Synthesis and characterization of biomimetic hydroxyapatite/sepiolite nanocomposites, *Nanoscale*, In Press, DOI: 10.1039/c0nr00650e

O.M. Istrate, B. Chen: Relative modulus–relative density relationships in low density polymer–clay nanocomposite foams, *Soft Matter*, In Press, DOI:10.1039/C0SM01052A

Michael B. Keogh, Sonia Partap, Jacqueline S. Daly, Fergal J. O'Brien Three Hours of Perfusion Culture Prior to 28 days of Static Culture, Enhances Osteogenesis by Human Cells in a Collagen GAG Scaffold. Published online 16 December 2010 in Wiley Online Library (wileyonlinelibrary.com). DOI 10.1002/bit.23032

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