

NANOTECHNOLOGY IN MEDICINE AND BIOTECHNOLOGY.

Institution of
**MECHANICAL
ENGINEERS**

5 October 2010
One Birdcage Walk, London

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THE EVENT WILL ADDRESS THE FOLLOWING QUESTIONS:

- What is the recent development on Nanotechnology?
- What are the current medical needs and healthcare needs?
- What are the existing and future applications of Nanotechnology in Medicine and Healthcare?
- What are the future needs in medicine and healthcare and what can Nanotechnology offer?

NANOTECHNOLOGY IN MEDICINE AND BIOTECHNOLOGY.

Nanotechnology is currently one of the most funded research areas in developed countries. It will have significant impact on the medical and biotechnology industries and healthcare technologies in the 21st century. Nanotechnology has wide-ranging applications, such as drug synthesis and delivery, cell surgery and therapy, early disease diagnosis and prevention, biosensors and medical implants.

This seminar aims to address technical topics working from the context of clinical needs, achievements and future aims. The event will explore relevant technical achievements, the role of nanotechnology in the advance of medicine and bio-sensing techniques. In the sessions of the seminar, the impact of nanotechnology will be demonstrated through leading presentations.

THIS EVENT WILL ATTRACT:

- University academics - postgraduate students, lectures, professors
- Medical students
- Biotechnology industries
- Researchers in R&D
- Clinicians
- Surgeons
- Government agencies

TECHNICAL ADVANTAGES:

The seminar will present the latest development in Nanotechnology research in the area of medicine and healthcare, with focuses on biosensing and medical diagnosis, and nanomaterials.

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NANOTECHNOLOGY IN MEDICINE AND BIOTECHNOLOGY

5 OCTOBER 2010

1 BIRDCAGE WALK, LONDON SW1H 9JJ

09.00 REGISTRATION AND REFRESHMENTS

09.15 CHAIRMAN'S WELCOME AND OPENING ADDRESS

SESSION I GENERAL TRENDS

Chaired by Professor Jon Cooper, University of Glasgow

09.30 KEYNOTE: OPPORTUNITIES AND ISSUES IN COMMERCIALIZING NANOMEDICINE

Professor Peter Dobson, RCUK Advisor on Nanotechnology, Oxford University

After a career as a lecturer in Physics at Imperial College and Senior Principal Scientist at Philips Research laboratories he was appointed to a University Lectureship and College Fellowship at the Queen's College Oxford in 1988 and a Professorship in 1996. At Oxford his research moved into the areas of nanoparticles, nanostructures, optoelectronics and biosensors.

10.10 TRENDS AND CHALLENGES IN NANOMEDICINE

- Developments in nanotechnology: The characteristics of materials at the nanoscale - significant therapeutic benefits and risks
- Bringing new nanomedical products to the market - important challenges

Richard Moore, Nanomedicine and Lifesciences Manager, Institute of Nanotechnology

Richard Moore is responsible for overall management of work programmes in nanomedicine and the lifesciences. This includes the NanoMedNet nanomedicine network for clinicians and other professionals and the development of a modular series of professional training courses and workshops in the field of nanomedicine.

10.35 Q&A SESSION

10.45 REFRESHMENTS

SESSION II MECHANICAL AND ELECTRICAL

Chaired by Professor Philip Prewett, University of Birmingham

11.05 BIOELECTRONICS

- Use of optics and acoustics to manipulate particles and cells
- New microfluidic and diagnostic formats
- Applications in biological assays

Professor Jon Cooper, Professor of Bioelectronics and Bioengineering, University of Glasgow

Professor Jon Cooper has developed a full range of technologies associated with Lab-on-a-Chip (including areas as diverse as bionanotechnology, microfluidics, surface analysis, biochip fabrication and development, instrumentation, modelling and cell based assays).

11.30 NANOMECHANICS AND MECHANOBIOLOGY FOR REGENERATIVE MEDICINE

- Mechanical stimuli: important for healing and regeneration
- Understanding and harnessing these effects for the development of new regenerative therapies

- Multi-scale analysis - translating macroscopic loading into cell-level stimuli

Dr Mark Thompson, University Lecturer in Orthopaedic Biomechanics, Institute of Biomedical Engineering, Department of Engineering Science, University of Oxford

Mark Thompson read Engineering and Materials Science for an MEng at Oxford and studied for a PhD in hip replacement design at QMW College London and the Robert Jones and Agnes Hunt Orthopaedic Hospital in Oswestry. A Marie Curie Fellowship took him to develop this work on hip replacements at the Orthopaedics Department at the University Hospital in Lund, Sweden.

11.55 INTEGRATED MICROSYSTEMS FOR BIOMEDICAL APPLICATIONS

- A microfluidic system for separating spermatogenic cells
- A microplate based biosensing system for cell monitoring
- A magnetic biosensor for protein identification

Dr Xianghong Ma, Senior Lecturer, Aston University

Dr Xianghong Ma worked in General Electric Global Research Center in New York for 2 years on reliability and combustion dynamics. She is currently Senior Lecturer at Aston University since April 2002. Her current research interests are in innovative sensing, actuation and manipulation tools for cell, tissue and body using state of the art technology, nanotechnology, embedded IT system, advanced signal processing and nonlinear dynamics technologies.

12.20 Q&A SESSION

12.30 LUNCH

SESSION III BIOCHEMISTRY AND BIOPHYSIC

Chaired by Professor Alok Bhushan, ISU Biomedical Research Institute

13.30 DEVELOPMENT OF POLYMERIC NANOCONJUGATE DRUG DELIVERY VEHICLES FOR CANCER TARGETING AND TREATMENT

- A drug delivery system for conjugating hydroxy-containing drugs
- A drug delivery nanomedicine for cancer targeting
- A study of tumor penetration using nanoparticle

Professor Jianjun, Assistant Professor, University of Illinois at Urbana Champaign

Professor Jianjun Cheng joined the faculty of University of Illinois at Urbana-Champaign in 2005. Dr. Cheng's research has made significant translational impact. At Inert Therapeutics he developed IT-101, a cyclodextrin polymer-based drug delivery technology for the treatment of colon cancer. IT-101 is now in Phase II clinical trial. Cheng's research on prostate cancer targeting using aptamer nanoparticle bioconjugates was highlighted by Forbes Magazine as one of the Top Five Nanotechnology Breakthroughs in 2006.

13.55 NANOTECHNOLOGY FOR BASIC RESEARCH IN CELL BIOLOGY

- Atomic Force Microscopy combined with confocal microscopy can be utilised to measure the elastic properties of living cells
- Atomic Force Microscopy can be utilised to investigate the dynamic mechanical properties of living cells

- Microfluidic devices can be utilised to investigate the cell biological mechanisms of white blood cell locomotion

Guillaume Charras, University Research Fellow, London Centre for Nanotechnology and Department of Cell and Developmental Biology, University College London

Dr Charra's general interest lies in the biophysics of living cells both at the single cell and tissue level. At the single cell level, his research aims to understand the biological and physical mechanisms that power cell motility within three-dimensional environments such as connective tissue.

14.20 TUNING SPECIFIC BIOMOLECULAR INTERACTIONS AT NANOSCALE USING SWITCHABLE

- Switchable biological surfaces – Biological and medical applications
- Biomolecular Interactions
- Dynamic self-assembled monolayers
- Electro-Switchable Oligopeptide Self-Assembled Monolayers

Dr Paula Mendes, University Academic Fellow, Chemical Engineering, University of Birmingham

Paula M Mendes received her MSc (1997) and PhD (2002) degrees in Chemical Engineering from the Faculty of Engineering, University of Porto, Portugal. In 1997, she was awarded a competitive University Fellowship to carry out research in computational chemical engineering at the National Polytechnic Institute of Lorraine (INPL), Nancy, France.

14.45 Q&A SESSION

15.00 REFRESHMENTS

SESSION IV SENSING AND MEDICAL APPLICATIONS

Chaired by Dr Xianghong Ma, Aston University

15.30 BIOMEMS: A MECHANICAL ENGINEERING PERSPECTIVE

- Microelectromechanical (MEMS) devices are increasingly aimed at biomedical applications
- The "PatchLab" concept provides point of use blood analysis using "nanosieve" nanofluidic technology
- A torsional resonant microsystem is aimed at the detection of anthrax and other agents of bioterrorism

Professor Phil Prewett, Lucas Professor of MicroEngineering & Nanotechnology School of Mechanical Engineering, University of Birmingham

Following his initial research in Plasma Physics and Field Emission Devices, Phil Prewett has spent more than 20 years working in MicroEngineering and Nanotechnology. His previous appointments at the Central Microstructure Facility, CLRC Rutherford Appleton Laboratory and Ion Beam Systems Ltd.

15.55 CONFOCAL RAMAN SPECTRAL IMAGING FOR BIOMEDICAL APPLICATIONS AT THE NANO- AND MICRO-SCALE

- Confocal Raman micro-spectroscopy (CRMS): label-free non-invasive investigation of biomolecules
- Application of CRMS for molecular imaging live cells
- Combined Atomic Force Microscopy-CRMS for nano-scale investigation of peptide nanotubes

Dr Ioan Notingher, Lecturer Nanoscience Group, The University of Nottingham

Dr Notingher's research interest is the development of new optical and spectroscopic methods for studying biological materials at a nano and micro-scale. His main focus is the development of Raman spectroscopic techniques for investigations of live cells, cell membranes and other cellular components.

16.20 MICROCANTILEVERS FOR HEALTHCARE AND LIFE SCIENCES

- Microfabrication and operation of novel microsystems for biomedical applications
- Measuring clotting time of whole blood using microcantilevers
- Other applications of microcantilevers

Professor Ejaz Huq, Council Fellow & Senior Principal Scientist, Science and Technology Facilities Council, Harwell Science and Innovation Campus

Professor Ejaz Huq is a Council Fellow and Senior Principal Scientist at the Science and Technology Facilities Council [STFC]. At the Micro and Nanotechnology Centre at STFC Huq directs a portfolio of R&D projects, focusing on microsystems for healthcare and life sciences.

16.45 CROSS RESISTANCE OF MAGNESIUM OXIDE NANOPARTICLES TO CISPLATIN IN LEUKEMIA CELLS: MECHANISTIC STUDIES

- Resistance mechanisms to anticancer drugs
- Role of MgO nanoparticles in society
- MgO nanoparticles effect on cell signalling and toxicity
- Implications of cross resistance to nanomaterials

Professor Alok Bhushan, Professor, Department of Biomedical & Pharmaceutical Science, ISU Biomedical Research Institute, Idaho State University

Dr. Bhushan has several publications, reviews, and abstracts to his credit. Bhushan teaches cancer related courses, FDA regulation, Pharmacogenomics, Nanosciences, principles of pharmacodynamics and case studies in College of Pharmacy, Idaho State University.

17.10 Q&A SESSION

17.20 CHAIRMAN'S CLOSING REMARKS

17.30 SEMINAR CLOSES

This programme is subject to change

Engineering in Medicine and Health Division Organising Committee:

Dr Xianghong Ma, University of Aston
 Professor Jon Cooper, University of Glasgow
 Professor Phil Prewett, University of Birmingham
 Professor Alok Bhushan, Idaho State University

The Committee would like to thank the following supporters:

Institution of nanotechnology, Institute of Materials, Minerals and Mining, KTN nanotechnology and health tech and medicines, EPSRC and Royal Society of Medicine

FORWARD THINKING

03 NOVEMBER 2010
1 BIRDCAGE WALK, LONDON
ROBOTICS IN SURGERY – STATE OF THE ART

This one-day seminar features leading researchers in the UK and Europe discussing their latest work. It will appeal to surgeons wishing to refresh their knowledge. It will interest medical device manufacturers looking for new market opportunities. Of course it will also attract present and future researchers to survey the scene, exchange ideas and form links for future work.

www.imeche.org/events/s1505

14 DECEMBER 2010
1 BIRDCAGE WALK, LONDON
THE CHANGING ROLE OF ENGINEERS IN ORTHOPAEDICS

In 1989 we hosted a seminar reviewing the role of engineers in orthopaedic related problems. This seminar will pull together some of the original speakers from the 1989 conference, in order for them to review progress as well as including new speakers.

www.imehce.org/events/s1514

01 – 03 NOVEMBER 2011
THE ROYAL COLLEGE OF SURGEONS OF ENGLAND, LONDON
ENGINEERS AND SURGEONS: JOINED AT THE HIP III

Following on from the success of the 2002 and 2007 events, this conference will once again bring together engineers and surgeons, academics and industrialists to discuss the latest issues and to act as a platform for the future development of hip arthroplasty.

To submit an abstract please email health@imeche.org

www.imeche.org/events/c1320

07 – 08 DECEMBER 2011
1 BIRDCAGE WALK, LONDON
INCONTINENCE: THE ENGINEERING CHALLENGE VIII

This two-day seminar is the principal European meeting in this area, and brings engineers, clinicians, researchers, commercial designers and producers, nurses, carers and users together, to examine existing solutions and solve current problems. As well as invited state-of-the-art lectures, experts from outside the incontinence world will present technologies with the potential to revolutionise current thinking.

www.imeche.org/events/s1545

JOURNALS

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Institution of Mechanical Engineers

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EVENT S1504
5.10.2010

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Conditions of Booking

Completed application forms should be returned to the address below, along with the correct payment. Attendance at the event will be confirmed on receipt of the full balance. All participants are advised to bring a copy of their confirmation with them on the day, to ensure the fastest possible entry.

Special Requirements

Please inform us of any special requirements ie dietary or access, on the relevant section of this form.

Cancellation

For a refund (minus £25 +VAT admin charge), cancellations must be received at least 14 days prior to the event. Replacement delegates are welcome at any time.

Supporting Organisations

Members of the following organisations can register at our members' rates: Institute of nanotechnology, Institute of Materials, Minerals and Mining, KTN nanotechnology, KTN health tech and medicines, EPSRC and Royal Society of Medicine

Venue

This event will be held at Institution of Mechanical Engineers, One Birdcage Walk, Westminster, London SW1H 9JJ. Details will be sent upon registration.

Insurance

The organisers do not accept liability for any injuries or losses of any nature incurred by delegates and/or accompanying persons, nor for loss or damage to their luggage and/or personal belongings.

Accommodation

We have arranged special discounted rates at local hotels via the Corporate Team. Our list of hotels will be forwarded upon receipt of your registration and payment.

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Enquiries

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