



## **Workshop on Biomedical Sensing and Imaging to the Nano-scale**

**Texas A&M University, College Station, Texas, USA, 25<sup>th</sup> and 26<sup>th</sup> October 2004**

### **Background and Aims:**

A workshop focusing on biomedical sensing and imaging to the nano-scale will be held at Texas A&M in College Station, Texas, USA on October 25<sup>th</sup> and 26<sup>th</sup>, 2004. The workshop will focus on nano and micro-sensing and imaging including optical approaches, protein sensors, MRI, and biomechanical approaches such as AFM.

The aims of the workshop are:

- To enable researchers from participating institutions in Texas and their colleagues from the UK to showcase relevant research activities.
- To allow researchers to network with colleagues and explore collaborative opportunities.

The overall outcomes should be:

- The development of collaborative relationships between researchers in the UK and in Texas.
  - The exploration of novel opportunities for collaboration across disciplines.
  - The sharing of emerging results.
  - The provision of access to specialist equipment and facilities.
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### **Biomedical Sensing and Imaging to the Nano-scale:**

#### **Sunday October 24, 2004 UK Visitors Arrive at Hilton, College Station**

5.30 – 8.00 pm      Reception and Dinner at the Hilton

#### **Monday October 25, 2004**

7.45 am      Continental Breakfast; 7.15am Bus from Hilton to George H. Bush Conference Center

8.30 am      Welcome, Introductions and Background to the Workshop  
Dr. G. Kemble Bennett, Ph.D., Vice Chancellor and Dean of Engineering  
Dr. Richard Ewing, Vice President for Research

9.00 am      TX-UK Collaborative Research Initiative - Funding Mechanisms

**Moderator: Dr. Samuel Ward Casscells- University of Texas Health Science Center at Houston**

- 9.15 am "Stochastic Sensing with Engineered Protein Pores"  
Professor Hagan Bayley  
University of Oxford
- 9.40 am "Gadofullerenes as Atypical MRI Contrast Agents: How Do They Work and What is Their Future?"  
Dr. Lon Wilson  
Rice University
- 10.05 am "In Vivo Scintigraphic Tracking of Nanoscale Liposomes for Targeted Drug Delivery"  
Dr. William Phillips  
University of Texas Health Science Center-San Antonio
- 10.30 am **Refreshment Break**
- 11.00 am "Light Activated Gold Nanoshells for Imaging Guided Cancer Therapy"  
Dr. John Hazle  
University of Texas  
MD Anderson Cancer Center
- 11.25 am "Peptide Aptamers as Sensors in Protein Arrays"  
Dr. Paul Ko Ferrigno  
University of Cambridge
- 11.50 am "Alliance for Nanohealth"  
Dr. Samuel Ward Casscells  
University of Texas Health Sciences Center at Houston
- 12.15 pm **Lunch**

**Moderator: Professor David Hawkes, King's College, London**

- 1.15 pm "Quantum Dots Unlocking Their Potential"  
Professor Paul O'Brien  
University of Manchester

1.40- 3.10 pm **BREAKOUT SESSIONS 1 & 2**

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**Session 1: Nano and Micro Single Molecule and Protein Sensing –  
Professor Hagan Bailey, Chair**

1. "Ion Channels in Lipid Bilayers for Single Molecule Detection", Professor Bob Miles, University of Leeds
2. "Nanometric Protein Arrays on Silicon Surfaces", Dr. Chengzhi Cai, University of Houston

3. "Functionalizing Surfaces for Surfaces for Nanoscale Assembly", Dr. Christoph Walti, University of Leeds
4. "Localized Generation of Atto- and Femto-Liter Droplets of High-concentration Protein Solution over Micron-size Electrodes", Dr. Peter Vekilov, University of Houston
5. "Imaging Biochemical Processes: Looking at New Signals", Dr. Richard Willson, University of Houston

### **Session 2: Bioimaging to the Nanoscale – Dr. Beth Goins, Chair**

1. "Fast Magnetic Resonance Imaging", Dr. Steven Wright, Texas A&M University
2. "Integration of Medical Image Information from Different Sensors and over Different Spatial Scales in Image Guided Interventions", Professor David Hawkes, King's College London
3. "Quantitative Functional and Structural Brain Image Analysis Research", Dr. Steve Smith, University of Oxford
4. "Overview of Small Animal Imaging Systems for Assessment of Nanotherapeutics", Dr. Beth Goins, University of Texas Health Science Center at San Antonio
5. "In Vivo Non-invasive Photoacoustic Tomography in Experimental Animals", Dr. Gheorghe Stoica, Texas A&M University
6. "Imaging of Signaling, Transcription and Gene Expression in Mammalian Cells", Dr. Mike White, University of Liverpool

3.10 pm      **Refreshment Break**

3.35 pm      "Optical Biosensing and Imaging"  
 Dr. Gerard L. Coté  
 Texas A&M University

4.00-5.30 pm      **BREAKOUT SESSIONS 3 & 4**

### **Session 3: Optical Micro- and Nano-scale Biosensing –Dr. Massoud Motamedi, Chair**

1. "Optimized Conjugation of a Fluorescent Labels to Proteins", Dr. Peter Roach, University of Southampton
2. "Quantum Dots for Micro- and Nano-scale Biosensing", Dr. Kenith Meissner, Texas A&M University
3. "Ádapting Digital Micromirror Technology to Sensing and Imaging“, Dr. Michael Huebschman, University of Texas Southwestern
4. "Non-destructive Tissue Characterization using Nonlinear Optical Microscopy", Dr. Alvin Yeh, Texas A&M University
5. "Nano-based Structures for Engineering of Biomedical Sensors and Tissues", Dr. Massoud Motamedi, University of Texas Medical Branch-Galveston
6. "FRET/FLIM: Detecting Molecular Interactions", Dr. Victoria Frohlich, University of Texas Health Science Center at San Antonio

#### **Session 4: Biosensing, Biomaterials, and Imaging including the use of Carbon Nanotubes – Dr. Lon Wilson, Chair**

1. “Easy Peptide Carbon Nanotube Devices”, Dr. Marc In het Panhuis, University of Hull
  2. “Nanotube Research at the Nanotechnology Research Institute of UU”, Dr. Pagona Papakonstantinou, University of Ulster
  3. “Sensing Molecular Signatures of Cancer Using Nanoshell Bioconjugates”, Chris Loo, Rice University
  4. “Combinatorial Mapping of Protein Interactions for the Development of Targeted Therapies and Imaging Agents”, Drs. Renata Pasqualini and Wadih Arap, UT MD Anderson Cancer Center
  5. “The Search for Fracture Toughness in Nanoparticle Reinforced Biomedical Resins”, Dr. Ralph Rawls, University of Texas Health Science Center at San Antonio
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- 5.30 pm      Reception and Tour at the George H. Bush Library  
*(Sponsored by the European Union Center at Texas A&M University)*  
Opening remarks, Dr. Emily Y. Ashworth, Assistant Provost for International Programs, EU Center  
Introduction, Dr. G. Kemble Bennett, Ph.D., Vice Chancellor and Dean of Engineering  
Speaker, Dr. Robert Gates, President Texas A&M University
- 7.30 pm      Bus to Faculty Club
- 8.00 pm      Dinner at the Faculty Club
- 10.00 pm     Return to Hilton by coach

#### **Tuesday October 26, 2004**

- 7.30 am      Continental Breakfast (7.15 am Bus from Hilton to Conference Center)
- 8.00 am      Welcome, Dr. Malcolm Andrews, Chair, Texas A&M TX-UK Steering Committee

#### **Moderator: Professor Paul O’Brien, University of Manchester**

- 8.15 am      “Imaging Innovations: Multi Modality Approaches to Assessing Gene Expression and Tissue Physiology”  
Dr. Ralph Mason  
University of Texas Southwestern
- 8.40 am      “Electrode Arrays for Integrating Micro and Nanotechnology with the Bioworld”  
Professor Tony Walton  
University of Edinburgh
- 9.05 am      “Multi-parameter Florescence Imaging”  
Dr. Mark Neil  
Imperial College, London

- 9.30 am “Applications of BioNanotechnology in Genomics, Proteomics and Cell Screening”  
Professor Jonathan M. Cooper  
University of Glasgow
- 9.55 am “Nanoparticles, Molecular Biosensors, and 3D Confocal Imaging”  
Dr. Jim Leary  
University of Texas Medical Branch-Galveston
- 10.20 am **Refreshment Break**
- 10.50 am “How Did That Get There: Bacterial Chemotaxis and Protein Localisation”  
Professor Judith Armitage  
University of Oxford
- 11.15 am “Nanoscience Research at UH Institute for Digital Informatics and Analysis”  
Dr. Donald Kouri  
University of Houston
- 11.40 am “Probing Bone Cell Function with AFM”  
Professor Michael A. Horton  
University College, London
- 12.05 pm “Nucleic Acid Biosensors”  
Dr. Andrew Ellington  
University of Texas at Austin
- 12.30 pm **LUNCH**

**Moderator: Dr. Jim Leary- University of Texas Medical Branch, Galveston**

- 1.30 pm “Visualizing Nuclear Receptor Function at the Subcellular Level”  
Dr. Michael Mancini  
Baylor College of Medicine
- 1.55 pm “Multi-Modal MEMS Sensors for Clinical Diagnostics”  
Professor Calum McNeil  
University of Newcastle

2.20-4.05 pm **BREAKOUT SESSIONS 5 & 6**

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**Session 5: Nanoscale Biosensing and Imaging including Biomechanics and Mechanobiology – Dr. Gerald Meininger, Chair**

1. “Study of the Mechanical Properties of Single Proteins using the Atomic Force Microscope”, Dr. Andres Oberhauser, University of Texas Medical Branch-Galveston
2. “Biomimetic Matrix Mechanics Regulated Endothelial Cell Adhesion Studied using the AFM-TIRFM”, Dr. Anshu Mathur, UT MD Anderson Cancer Center

3. "Subcellular and Macromolecular Electron Microscopy", Dr. Andreas Holzenburg, Texas A&M University
4. "Mechanobiology as a Contact Sport: Studies Combining Atomic Force Microscopy with Fluorescence Microscopy", Dr. Gerald Meininger, Texas A&M University
5. "Polymer Therapeutics for Drug and Protein Delivery", Professor Ruth Duncan, University of Cardiff

**Session 6: Nano and Micro Biosensor Technologies – Dr. Colin Campbell, Chair**

1. "Analysis of IFM Experiments on a Self-Assembled Monolayer", Dr. Mingji Wang, University of Texas at Austin
  2. "Membrane Materials and Biosensors", Dr. Sub Reddy, University of Surrey
  3. "Nanoswitches for Biosensor Applications", Dr. Colin Campbell, University of Edinburgh
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4.05 pm      **Concluding Remarks - Workshop Finishes**

4:30 pm      Return to Hilton by coach