Programme

Workshop on biomolecular interactions: current and future technologies

Background
Quantitative bioscience is becoming more and more important in defining the molecular processes of life. This includes the absolute measurement of biomolecular interactions in vitro and in vivo. In particular, complex systems are now being studied, using a holistic approach, in which biophysical measurements of individual components can be used to obtain kinetic models of biochemical pathways. In addition, the mechanism of action of drugs and methods of discovery of new drugs requires an understanding of the assay technologies available and one that best suits that interaction of study.

Who should attend?
We propose a workshop on ‘biomolecular interactions: current and future technologies’ which will be targeted to academic groups who have an interest in molecular interaction analysis/drug discovery and biotech companies who seek to employ such techniques in their laboratories. The focus of this course will be on label free methods (e.g. SPR and ITC) and fluorescence methods, with hands on experience on state of the art instrumentation currently available from leaders in the field.

Key personnel for the workshop

Dr. Antonio Inforzato (workshop organiser)
Dr. Antonio Inforzato is a MRC funded Research Fellow at the Faculty of Life Sciences, University of Manchester. Antonio was born and educated in Italy, where he obtained his Masters in Chemistry from University of Naples “Federico II” (2001) and a PhD in Immunology from University of Rome “Tor Vergata” (2006). His major interest is in characterizing the structure/function relationship of proteins and protein complexes involved in assembly and function of the extra-cellular matrix, His main focus is on the long pentraxin PTX3, an acute phase glycoprotein, which has key roles in inflammation, fertility and vascular biology.

Dr Malgorzata Adamczyk (workshop co-organiser)
Dr. Malgorzata Adamczyk is currently working as a researcher at the Manchester Interdisciplinary Biocentre (MIB). Her research focuses on DNA-protein interactions of prokaryotic centromers. She obtained her PhD in biochemistry from The Institute of Biochemistry and Biophysics, Polish Academy of Sciences. She has represented the European Federation of Biotechnology, working group: journalists and the media to improve the public perception of biotechnology in Poland. Dr. Adamczyk has organized science popularization events for The Ministry of Science and Higher Education sponsored by European Commission (Poland). She was awarded the team first prize in a contest “The Science Popularizer-2006” by the Polish Press Agency. Recently, she co-organized a FEBS Advanced Course “New Developments in quantitative Molecular Biosciences”, which was held in Greece, 2008.
**Dr. Thomas Jowitt (workshop co-organiser)**

Dr. Jowitt is a senior experimental officer at the Biomolecular Analysis Core Facility at the Life Sciences facility at Manchester University. This facility contains 16 complimentary analysis systems (biophysical and mass spectrometric) supported by high resolution electrophoretic and chromatographic micro separation systems. The facility has been set up to promote and facilitate the use of biomolecular analysis techniques in the Faculty. There are a number of different modes of interaction with the facility including tailored project advice, full service provision, project-work involving facility staff and supported instrument access. Instrumentation includes analytical ultracentrifugation, calorimetry, circular dichroism, fluorescence spectroscopy, multi-angle light scattering and surface plasmon resonance.

**Dr. Farid Khan (main organiser)**

Dr. Khan is a senior researcher in biomolecular interactions at the Manchester Centre for Systems Biology. His role includes measurement of enzyme kinetics and binding parameters in biochemical pathways in order to model pathways in organisms. He is an experienced bio-technologist with a PhD in protein engineering from Cambridge University, with expertise in biophysical techniques including drug discovery, biochip arrays, fluorescence detection systems, cell free synthesis, molecular interactions, assay development (GSK), molecular biology, protein stability, folding kinetics, protein structure (NMR, fluorescence and CD) and protein purification. Dr. Khan is also a lecturer in a Masters course in Biotechnology and Enterprise at the University of Manchester. He has given seminars on his work and teaches advanced protein techniques to graduates and staff. Dr. Khan is a partner in a European project dedicated to new molecular tools to analyse protein interactions of the human proteome.

**Mr. Pirthipal Singh (workshop speaker)**

Mr. Pirthipal Singh has over 30 years experience at AstraZeneca in assays development for drug discovery and HTS. Recently, he has formed his own consultancy in which he provides a service for support and training for academics and the pharma-biotech industry. His expertise lies in new technology evaluation and project support. In particular, he lectures on biochemical assay development (binding and enzymatic) and he has experience of numerous projects (pre- and post-HTS) covering many target classes, including the use of radioactive and non-radioactive signal outputs, as well as direct and indirect detection (immunoassays) assay methods. He has also implemented automation for compound dissolution and assay assembly to help streamline assay protocols with development and screening in assay panels for compound profiling. He has introduced several commercially available homogeneous ('mix-and-measure') assay methods (alongside assay miniaturization and automation) to increase HTS capacity, efficiency and data quality. Mr. Singh has also provided training and support provided to AstraZeneca staff, with respect to emerging technology evaluations and assay developments for both project needs and HTS.

**Dr. Sanjay Nilapwar (speaker)**

Dr. Nilapwar is currently working as an experimental officer managing Biomolecular Interactions facility at the Manchester Interdisciplinary Biocenter (MIB, Manchester University). His role includes teaching, experimental work, method development and daily management of the Biomolecular Interactions Facility. He is an experienced molecular biophysicist with a PhD from University College London, with expertise in biophysical techniques including ITC, CD, SPR, light scattering and capillary electrophoresis. He has
more than six years of hands on experience on measurement and interpretation of thermodynamic data in biological systems.

**Dr. Tariq Ali (co-organiser)**

Tariq Ali is a research associate in the faculty of Life sciences, University of Manchester working on the functional characterisation of molecules associated with the extracellular matrix. He currently specialises on protein expression and bio-molecular interactions using a range of cell and molecular biology and biophysical techniques. He obtained his PhD from the University of Cambridge working on DNA-protein interactions and then moved to the University of Oxford where he was involved with the functional and structural characterisation of specific members of the TGF-beta super-family of proteins.

**Workshop on biomolecular interactions: current and future technologies**

**Dates**  1-4\textsuperscript{th} June, 2009

**Venue**  The University of Manchester Incubator Company  
UMIC  
Grafton Street  
Manchester M13 9XX  
www.umic.co.uk

**Confirmed Sponsors:**

![Attana](image1)  ![Beckman Coulter](image2)  ![Berthold Technologies](image3)  ![Bio-Rad](image4)  
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![MicroCal](image13)  ![S&M](image14)  ![SRU Biosystems](image15)  ![TTP LabTech](image16)  
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![TA Instruments](image17)  ![TTP LabTech](image18)
1. **Label-free molecular interaction analysis**

Day 1

**Workshop 1: BIAcore technology-Surface Plasmon Resonance (SPR)**

(Dr. Tim Fagge, GE Healthcare)

**Morning**

(i) **Basic kinetics course**
- Introduction to Biacore’s technology.
- Basic theory of kinetic and affinity analysis
- Software evaluation of data from 1:1 binding experiments
- Recognition of deviations from 1:1 binding model
- Optimization of important experimental parameters

Afternoon

(ii) **Advanced Kinetics course**
- Advanced evaluation features
- Custom evaluation models
- Interpreting the fit
- Case studies & Hands on practical using the Biacore T100

Day 2

**Workshop 2: Emerging technologies**

**Morning**

(i) Analight technology (Farfield)
(ii) Attana 100 (Attana sensor technologies)
(iii) Acoustic sensing with the RAPid4 (TTP Labtech)
(iv) Reichert SPR technology and the Q-Sense E4 (S&M Products Ltd)
(v) BIND Reader biomolecular interactions in microplates (SRU Biosystems)
(vi) Corning Epic System HTS screening system (Corning)
(vii) SensiQ Pioneer (Labtech International)
(viii) The Octet Red measuring protein interactions and small molecules (FortéBio)
(ix) ProteOn XPR36 Protein Interaction Array System (BioRad)
Afternoon

 Isothermal Titration Calorimetry (ITC)

(i) Introduction to Isothermal Titration Calorimetry (Dr. Geoff, Holdgate, AstraZeneca, UK)

(ii) Investigating Thermodynamics of Molecular Interactions by ITC (MicroCal, UK)

(iii) Application of Microcal ITC200 in determination of Enzyme kinetics parameters (Dr. Sanjay Nilapwar, MIB, UK)

(iv) Enzyme kinetics, protein interactions and membrane interactions (Speaker TBA, TA Instruments, West Sussex)

(v) Thermodynamics and drug assays (Dr. Malkhey Verma, MIB, UK)
2. Fluorescence assays in drug discovery

Day 3

Workshop 3: Fluorescence based technologies

Morning

(i) Overview of homogeneous fluorescence techniques used in HTS for drug discovery and assay development

(Dr. Farid Khan, MCISB, U.K)

- Basic principles underlying fluorescence assays.
- Labels and labelling chemistries
- Instrumentation, Interferences and limitations
- Biochemical and cellular applications.

Afternoon

(ii) Enzyme and Binding Assays in Drug Discovery

(Mr. Pirthipal Singh, Singh Consultancy, UK)

- Basic principles underlying enzyme and binding assays.
- Enzyme kinetics inhibition: competitive, noncompetitive, uncompetitive, irreversible etc.
- Assay Development / Screening projects and HTS
- Assay miniaturization and automation
- Case studies: focus on kinases, and proteases.
- HTRF Kinase assays (Beckman-DTX and BMG-Labtech’s PHERAstar & CisBio reagents)

3. Exhibitors Fair & Talks

Day 4

Morning

**Attana sensor Technologies**
The Attana series of Biosensors

**Beckman Coulter**
DTX multimode plate readers and the Optima series for label free detection

**Berthold Technologies**
Mithras and TriStar multimode readers.
BioRad
ProteOn XPR36 Protein Interaction Array System

BMG’s Labtech
POLARstar Omega,
PHERAstar PlusOmega Series, RUBYstar

Caliper Life Sciences
The LabChip EZ Reader.

Cis-Bio
TR-FRET assays

Corning
Corning Epic System HTS screening system

Farfield
The Analight system

Afternoon

FortéBio
The Octet Red system

GE Healthcare
Biacore SPR systems:
Biacore X100, Biacore T100, Biacore A100 and Biacore Flexchip systems.

Labtech International
SensiQ Pioneer, Modulus II Multi-detection Microplate Reader and NanoDrop series of instruments.

MicroCal
The ITC200 and fully automated ITC system

Scientific & Medical Products Ltd
Reichert SPR and Q-Sense and QCM-D techniques.

SRU Biosystems
The BIND SPR system

TA Instruments
The Nano ITC, Nano DSC and TAM microcalorimeter systems

TTP LabTech
RAPid 4 i and Acumen ‘X3 instruments.