invent DCU

A Journey of Discovery

LIFE SCIENCE EXPERTISE

Research & Development

in partnership with Dublin City University

tel: + 353 1 700 7777
www.dcu.ie/invent

Invent,
Dublin City University,
Collins Avenue,
Dublin 9

DCU

LIFE SCIENCE EXPERTISE

Enhance your R&D Capability

by partnering with
Dublin City University

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Diversify

and strengthen your research capacity in

partnership

with DCU.

As Ireland's University of Enterprise, DCU invites you to partner with us and benefit from world class expertise and state-of-the-art facilities.

In order to build and maintain competitive advantage, pharmaceutical and biotechnology companies are moving toward a model of external engagement; leveraging external resources and capability to enhance their in-house research and product development efforts. Life science companies can benefit significantly by engaging in mitigated-risk, collaborative research with Universities and through the out-sourcing of work across the product development pipeline to academic groups.

DCU's expertise can be leveraged to meet your technical needs from early stage technology development, through proof of concept validation, clinical evaluation to market launch. You can access expertise in disciplines ranging from biotechnology, health & human performance and nursing to mathematical, chemical and physical sciences, as well as the resources of four National health-related research centres.

You can also access DCU's **specialist facilities** and **equipment**. Examples include the National Bio-photonics and Imaging Platform, which has a suite of advanced microscopy and spectroscopy instruments, the new DCU–GMP Facility, which is the first of its kind in Ireland and will be used for large-scale isolation of bio-therapeutics, the BDI Polymer Microfabrication Suite and the IDA-sponsored National Institute for Bioprocessing Research and Training (NIBRT), which is a partnership between UCD, DCU, Sligo-IT and TCD and replicates the most modern industrial bioprocessing facility. The centre page of this brochure gives a high-level overview of key facilities that are available.

To help you identify specific academic groups that best complement your needs, this document presents DCU's research and expertise across discrete **therapeutic areas**, and across a range of **enabling platform technologies**.

Therapeutic Areas:

- Auto-immune & Inflammatory conditions
- Cardiovascular Disease
- Diabetes
- Infectious Disease
- Neurotherapeutics
- Oncology

Enabling Platform Technologies:

- Platform Diagnostic technologies
- Platform Bio-therapeutic Development technologies
- Advanced analytics
- Computer Modelling
- Design and development of medical devices
- Protein engineering
- Nano-technology

Accelerate

your Research & Development activity in

partnership

with DCU.

The Invent team provides a critical link between the University and the marketplace and is made of up of highly skilled technology transfer professionals with experience in Intellectual Property management and its commercialisation through technology transfer, licensing and the creation of campus companies.

Key academic staff are highlighted throughout this document and their research priorities indicated.

Should you wish to engage with a DCU researcher or research group, the commercialisation team at Invent DCU are happy to facilitate this. Invent DCU is the Innovation and Enterprise Centre based at Dublin City University.

There are many State-funded schemes to support industry-academic collaborations. Such initiatives range from shared risk research consortia, exemplified by the SFI-co-funded Biomedical Diagnostic Institute to bi-lateral, shorter-term development work and service provision, supported by Enterprise Ireland Innovation partnership or Innovation Voucher schemes. We have extensive experience in leveraging such funding to pursue and provide solutions for technical and clinical unmet needs.

Prof. Alan Harvey

Vice President of Research and Innovation at DCU

Prof. Harvey has significant experience in the commercial development of novel therapeutics and strategic oversight of research, innovation and commercial activity across the University.

alan.harvey@invent.dcu.ie | **01 700 8070**

Richard Stokes

CEO Invent and Director of Innovation for DCU

Richard has significant experience in building and managing innovative, technology based businesses and currently leads commercialisation, technology transfer and business development at Invent DCU.

richard.stokes@invent.dcu.ie | **01 700 7777**

Georgina Murphy PhD

Invent's Commercialisation Manager with responsibility for Lifesciences

Please contact Georgina for further information regarding DCU's expertise in pharmaceutical and bio-pharmaceutical therapeutics, medical devices and biomarker-based diagnostics.

georgina.murphy@invent.dcu.ie | **01 700 8919**

Carolyn Hughes PhD

Invent's Commercialisation Manager with specific responsibility for Physical and Chemical sciences

Please contact Carolyn for further information regarding DCU's expertise in the areas of sensors, smart materials, chemistry, analytical separation science, electronic and nano-materials and plasma processing.

carolyn.hughes@invent.dcu.ie | **01 700 7004**

Emma O'Neill

Intellectual Property Manager for the Biomedical Diagnostics Institute (BDI)

The BDI is an SFI funded research centre, focused on development of next generation biomedical diagnostics. Emma is the key point of contact for companies seeking collaborative engagement with the BDI or to find out more about BDI technologies that are available for licensing.

emma.oneill@invent.dcu.ie | **01 700 7741**

LIFE SCIENCE EXPERTISE

Therapeutic Areas

Research & Development

Autoimmune Disease & Inflammatory Conditions

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

- Development of models of cytokine-induced BBB disruption
- Viral immunology and subversion of immune response
- Human immune modelling
- Interactions of bacteria with the immune system

Dr. Phillip Cummins
www.preventivemedicine.ie

THERAPEUTIC DEVELOPMENT

- Identification of therapeutic molecules/pathways in infection and autoimmunity
- Novel marine compounds in inflammatory disease

Dr. Patricia Johnson
Dr. Christine Loscher
www.dcu.ie/biotechnology

Cardiovascular Disease (CVD)

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

- Integrin signalling, activation and regulation (eg. adhesion and migration)
- Cytoskeletal and and actin dynamics
- Investigation of uPAR-integrin interactions and signalling pathways in CVD and inflammation
- Epigenetic and microRNA-mediated regulation in Cardiovascular disease
- Megakaryocyte and platelet functional biology
- *In vitro* modelling of vascular smooth muscle and endothelial cells
- Animal models of Cardiovascular disease
- Bioinformatics and molecular biology of Cardiovascular disease
- Cellular signalling mechanisms in endothelial homeostasis and dysfunction
- Impact of blood flow-associated haemodynamic forces on endothelial signal transduction, gene expression and barrier regulation

Dr. Ronan Murphy
www.preventivemedicine.ie

Prof. Paul Cahill
www.dcu.ie/biotechnology

Prof. Harry Holthofer
www.dcu.ie

Dr. Phillip Cummins
www.preventivemedicine.ie

THERAPEUTIC DISCOVERY & DEVELOPMENT

- *In vitro* and *in vivo* testing of adverse effects of biologics and drugs using novel cellular and molecular biomarkers (stratification of clinical trials, personalised medicine, pharmacogenomics)
- Diagnostic development

Dr. Ronan Murphy
www4.dcu.ie/shhp

MEDICAL DEVICES DEVELOPMENT

- Stent coating
- Cardiovascular tissue engineering and design of minimally invasive intravascular devices
- *In vitro* modelling of in-stent restenosis
- Development of vascular tissue engineering platforms
- Cardiovascular biomechanics
- Numerical modelling of intravascular stents
- *In vitro* and *in vivo* testing of adverse effects of devices (microparticles as biomarkers)

Dr. Ronan Murphy
Dr. Phillip Cummins
www.preventivemedicine.ie

Dr. Garrett McGuinness
Dr. Caitriona Lally
Prof. Paul Cahill
www.medeng.dcu.ie

invent DCU

From idea to innovation.

Diabetes

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

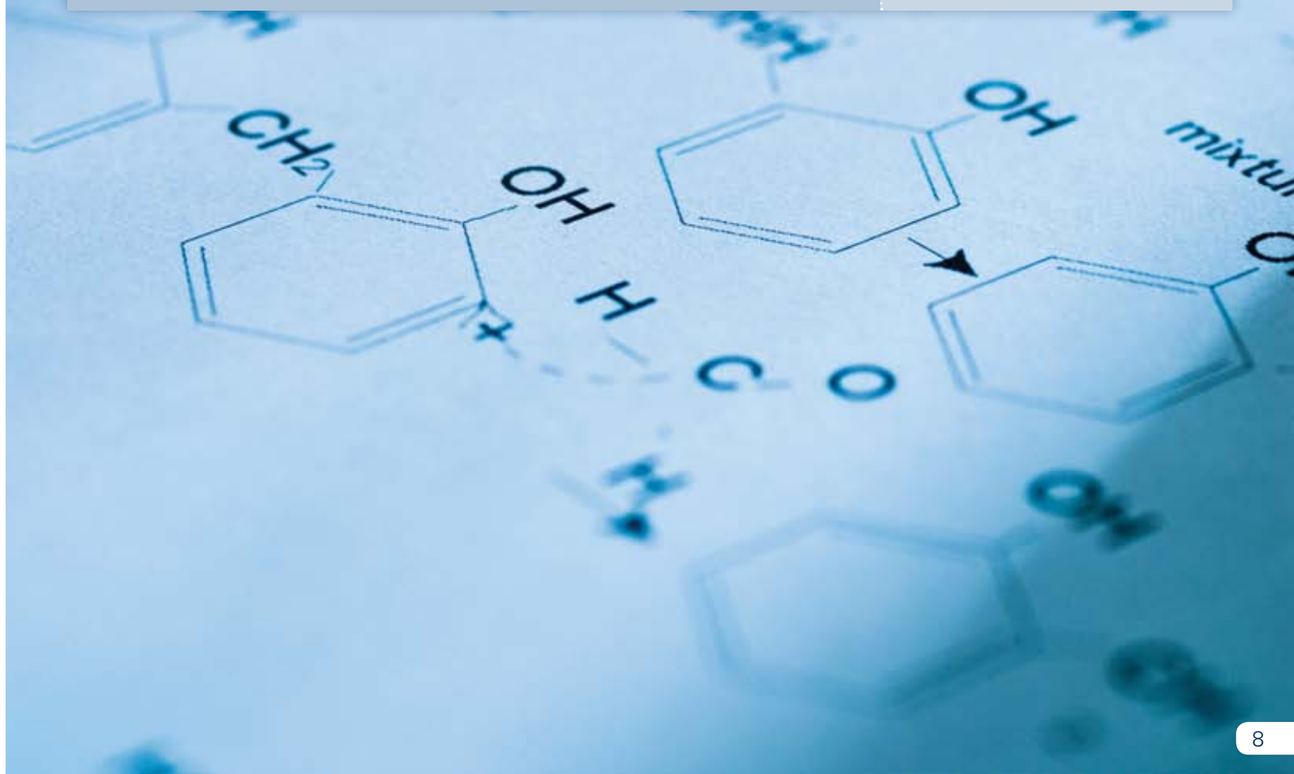
- Isolation and purification of the islets cells
- Protein, mRNA and microRNA profiling of islets
- Pathophysiology of insulin resistance
- Insulin and non-insulin mediated glucose transport
- Whole body and cellular regulation of energy expenditure

Prof. Martin Clynes
www.nicb.dcu.ie

Dr. Donal O'Gorman
www.preventivemedicine.ie

- Animal models of diabetes and diabetic nephropathy
- Bioinformatics and molecular biology of the kidney glomerular filtration barrier
- Epigenetic and microRNA-mediated regulation in diabetes

Prof. Harry Holthofer
www.dcu.ie



From concept to the clinic.

Infectious Disease

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

- Discovery, analysis and roles of viral microRNAs (with particular interest in herpesvirus Epstein-Barr virus (EBV))
- Assay development for nucleic acid detection
- Altered proteo-glycome composition in response to viral infection

THERAPEUTIC DISCOVERY & DEVELOPMENT

- Discovery and isolation of therapeutic antigens from helminth parasites
- Discovery and testing of vaccines for the prevention of helminth parasitic infections

Dr. Sandra O'Neill
Dr. Dermot Walls
www.dcu.ie/biotechnology

Neurotherapeutic Development

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

- Development of new generations of BOTOX engineered for therapeutic application
- Design of delivery vehicles for neurotherapeutics
- Generation of viral vectors for toxin therapy

THERAPEUTIC DISCOVERY & DEVELOPMENT

- Recombinant 'recreation' of the oligomeric subtypes of voltage-activated K+ channels
- Animal models of chronic and acute pain (including osteo-arthritic pain, neuropathic pain)
- Automated high-throughput screening of therapeutic agents

Prof. Oliver Dolly
www.dcu.ie/icnt

Ocular Diseases

THERAPEUTIC DISCOVERY & DEVELOPMENT

- Development of techniques for stem cell therapy and tissue engineering

Dr. Finbarr O'Sullivan
www.nicb.dcu.ie

Oncology

DISEASE PATHOLOGY & NOVEL TARGET DISCOVERY

- Disease Focus: Breast Cancer (including HER2 positive and triple negative) Ocular Melanoma, Cutaneous Melanoma, Malignant Melanoma , Multiple Myeloma, Colorectal Cancer, Lung Cancer
- Investigation into the molecular determinants of resistance to endocrine-directed therapies
- Investigation of kinases and signalling pathways in cancer
- Mutation driven selection of malignant neoplasms
- Label-free quantitation of cellular proteins from cancer models using LC-MS
- Identification of novel cancer invasion-associated targets
- Investigation into Epstein-Barr virus and associated lymphomas

Dr. Sinead Aherne
Dr. Norma O'Donovan
Dr. Kathleen O'Connell
Dr. Paula Meleady
Dr. Stephen Madden
www.nicb.dcu.ie

Prof. John Crown
www.mtci.ie

Dr. Dermot Walls
www.dcu.ie/Biotechnology

NOVEL DIAGNOSTICS

- Discovery and early stage validation of cancer biomarkers
- Patented biomarker panels for diagnostic and prognostic applications
- Generation of monoclonal antibodies to cancer targets

Prof. Martin Clynes
Dr. Paul Dowling
Dr. Anne-Marie Larkin
www.nicb.dcu.ie
www.mtci.ie
www.icorg.ie

THERAPEUTIC DISCOVERY & DEVELOPMENT

- Novel targeted therapies for triple negative Breast Cancer response and resistance to HER2 targeted therapies in Breast Cancer
- Characterisation of cellular responses to anti-cancer agents
- Quantitation of cancer drugs using LC-MS
- Translational Cancer Pharmacology: correlation of drug actions with toxicity/resistance
- Elucidating the potential health benefits of combining polyunsaturated fatty acids with chemotherapy drugs for treatment of drug-resistant cancer
- Phase I /II clinical trials
- Biosafety

Prof. John Crown
www.mtci.ie

Prof. Martin Clynes
Dr. Robert O'Connor
Dr. Anne-Marie Larkin
Sandra Roche
Dr. Rosaleen Devery

www.nicb.dcu.ie
www.icorg.ie

ENABLING TECHNOLOGIES

- Bioinformatics
- Proteomics
- *In vitro* models

Dr. Stephen Madden
Dr. Colin Clarke
www.nicb.dcu.ie

Specialist Facilities & Equipment

Expand and strengthen your research capacity through strategic engagement with DCU.

Target Selection

Proteomics

- ABI 4800 Plus MALDI TOF
- Thermo LTQ Orbitrap XL

Advanced microscopy

- Leica SP2 AOBS Confocal Microscope
- Time-lapse Nikon Eclipse Tie fluorescent inverted microscope with a cooled Photometrics Cool Snap HQ2 camera (controlled via Metamorph software)
- Flow cytometry including high-throughput analysis (Guava EasyCyte Plus platform)
- BD FACSAria cell sorter

Bio-informatics

- Date analysis routines using R and Bioconductor and the application of multivariate statistics and machine learning approaches such as:
- Principal components analysis
- Partial least squares
- Artificial neural networks
- Support vector machines

Sample Biobank (Oncology)

Pre-Clinical Development

Animal Models

- Pain

> Osteo-Arthritis,
> Rheumatoid Arthritis
> Neuropathic Pain

- Inflammatory Disease
- Cardiovascular Disease
- Diabetes

Design & Development of Therapeutics

- Automated **high-throughput screening** for ion-channel activity **(Q-patch technology)** - dose-response and toxicity studies
- Advanced facilities for rapid screening and characterisation of antibodies
- **Biocore 4000** - high quality, high content data, parallel analysis array format system
- Ultra-sensitive **Pharmaceutical Quantification** and **Pharmacokinetics** (Agilent 1200 Rapid Resolution LC system integrated to a 6400 Triple Quad Mass Spec detector).

Design & Optimisation of Medical Devices

- **Polymer Microfabrication Suite**
- **Ultrasonic medical device technology**
- **Casting**
- **Prototyping** of medical devices
- **Computer Aided Design** of medical devices
- **Computational Fluid Dynamics**
- Non-contact **Topography Characterisation**
- High velocity oxy-fuel coating spraying **(HVOF)** and **Thermal Spray** capabilities

Clinical Testing

- **Biosafety**
- **Phase I/II clinical trials**

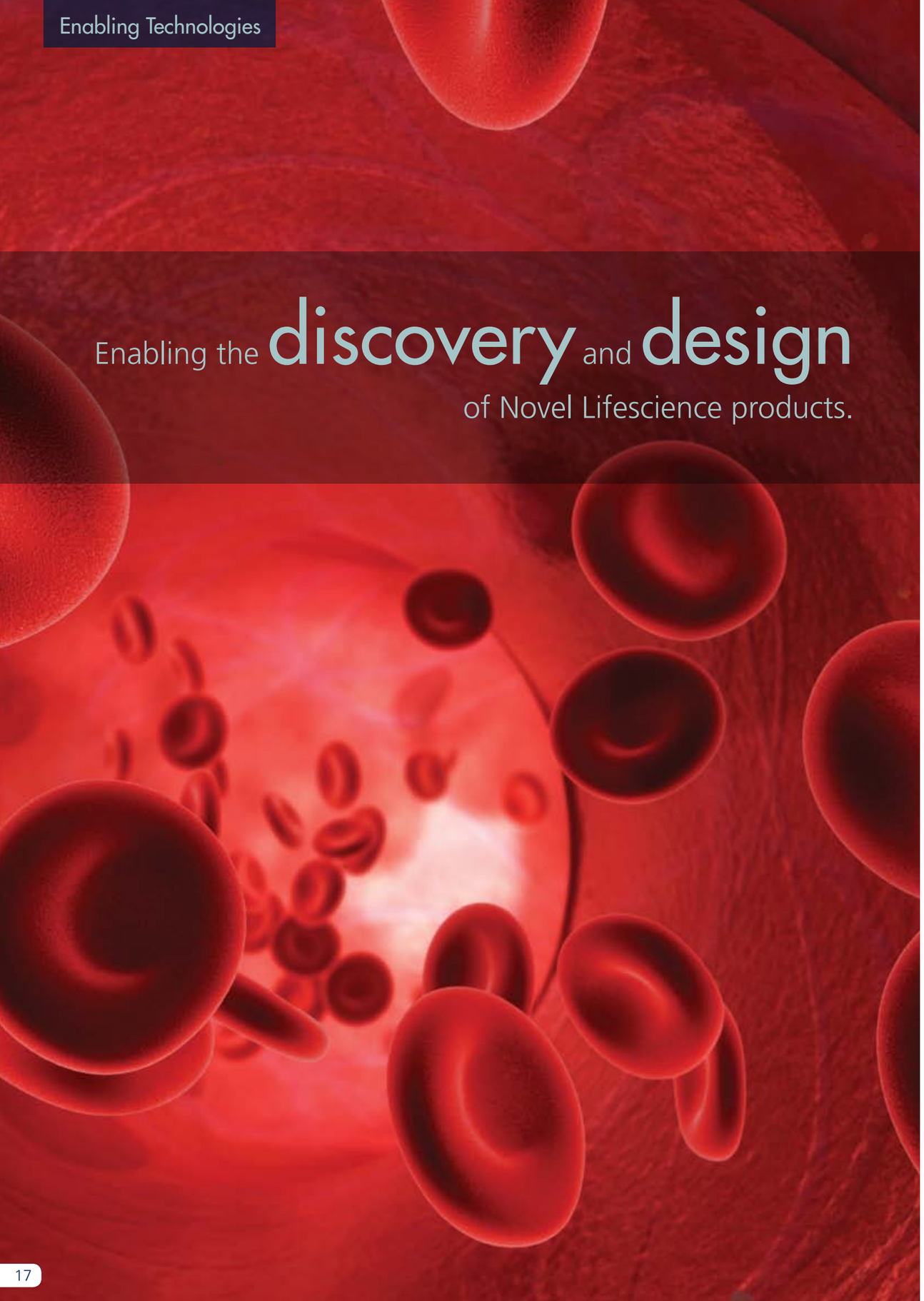
Manufacturing

- **GMP** accredited manufacturing
- **Bioprocessing pilot plant,** including on-line monitoring and control of bio-processes

LIFE SCIENCE EXPERTISE

Enabling Technologies

Research & Development



Platform Diagnostic Technologies

ANTIBODY DEVELOPMENT

- Development of antibody-based diagnostic devices

Prof. Richard O'Kennedy
Dr. Stephen Hearty
Dr. Paul Leonard
www.bdi.ie

SENSOR TECHNOLOGIES

- Transduction Science
- Signal Amplification Science
- Wearable sensors for health monitoring

Prof. Colette McDonagh
Prof. Robert Forster
www.bdi.ie

MICROFLUIDICS

- Integrated lab-on-a chip technologies
- Design and fabrication of microfluidic platforms for analytical and bio-analytical platforms

Prof. Dermot Diamond
www.dcu.ie/chemistry

Prof. Jens Ducree
www.bdi.ie

Platform Bio-Therapeutic Development Technologies

ANTIBODY TECHNOLOGIES

- Immuno-analysis of therapeutics, drugs of abuse, cancer-related markers, infectious diseases and disease markers
- High-throughput cell screening

Prof. Richard O'Kennedy
Dr. Stephen Hearty
www.bdi.ie

Dr. Paul Leonard
www.dcu.ie/~leonarp/

BIO-THERAPEUTIC PRODUCTION

- Analysis of gene and protein expression profiles in CHO cell lines
- Identification of biomarkers indicative of improved cell performance in the bioreactor
- On-line monitoring and control of bioprocesses (incl. in-situ product recovery)
- Use of bacterial lectins to characterise glycoforms of bio-therapeutics

Dr. Niall Barron
Prof. Martin Clynes
Dr. Padraig Doolan
www.nicb.dcu.ie

Prof. Ian Marrison
www.nibrt.ie

ENCAPSULATION TECHNOLOGIES

- Micro- and nano- encapsulation for targeted drug delivery
- Degradable polymers (polyesters, polypeptides) for drug delivery
- Membrane dynamics in liposomes
- Magnetoliposomes

Dr. Paul Clarke
Dr. Michael O'Connell
www.dcu.ie/Biotechnology

Prof. Ian Marrison
www.nibrt.ie

SYNTHETIC & MEDICINAL CHEMISTRY

- Synthesis and structural characterisation of biologically active compounds and anion sensing agents
- Design of metal-based therapeutics
- Design of low-mass, metallo-enzyme mimics for superoxide dismutase (SOD) and catalase (CAT)
- Synthesis and structure of organometallic hetero-aromatics as novel therapeutics (K+ channel blockers)

Dr. Dermot Brougham
Dr. Andreas Heise
www.dcu.ie/chemistry

Dr. Andrew Kellett
Dr. Peter Kenny
Dr. Paraic James
Dr. John Gallagher
www.dcu.ie/chemistry

Advanced Analytics

BIO-ANALYSIS

- Design and characterisation of monolithic and particulate stationary phases for bio-analysis
- Multi-dimensional chromatography
- Bio-affinity sample preparation and/or chromatographic separations
- Capillary electrophoresis (CE)
- Capillary electrochromatography (CEC)
- Microchip electrophoresis

Dr. Blanaid White
Dr. Damian Connolly
Dr. Mercedes Vazquez
Dr. Fengjun Shang
www.separationscience.ie

BIO-INFORMATICS & BIOSTATISTICS

- Evolutionary analyses of mammalian genomes and disease
- Machine learning
- Multivariate statistics
- Correspondence analyses
- Co-inertia analysis
- Microarray analysis
- Transcriptomics analysis
- Mathematical modelling of dissolution environments (DE models)
- Probabilistic dissolution models (direct & inv MC models, hpc)
- Therapeutic implant integration model (hpc, Bayesian & DE models)

Dr. Mary O'Connell
www.dcu.ie/Biotechnology

Dr. Colin Clarke
Dr. Stephen Madden
Dr. Padraig Doolan
www.nicb.dcu.ie

Dr. Heather Ruskin
Dr. Martin Crane
http://sci-sym.dcu.ie/

MEDICINAL CHEMISTRY

- Medicinal chemistry via asymmetric catalysis
- Chemical crystallography
- Crystal engineering in solid state design
- Macrocycles, alkaloids
- Green chemistry

Dr. Nick Gathergood
Dr Christopher O'Brien
Dr. Paraic James
Dr. John Gallagher
www.dcu.ie/chemistry

SENSOR TECHNOLOGIES

- Stimuli-responsive polymers and gels
- Photo-controlled uptake and release of molecular guests
- Polymer (artificial muscle) actuators

Prof. Dermot Diamond
www.dcu.ie/chemistry

SEPARATION & DETECTION TECHNIQUES

- Application of analytical separation and detection techniques including HPLC, CE, MS and biochemistry (FACS, Comet)
- Investigating the role of metals (e.g. iron and copper) in initiation and propagation of oxidative stress
- Development of chromatographic stationary phases using novel monolithic polymers to develop tunable stationary phases

Dr. Blanaid White
www.separationscience.ie
www.dcu.ie/chemistry

SPECTROSCOPY

- NMR spectroscopy applied to materials science
- Electrochemistry
- Interfacial science
- NMR spectroscopy for study of dynamic processes in the solid and liquid state
- Nanoparticulate contrast agents for medical imaging

Dr. Dermot Brougham
Prof. Robert Forster
www.dcu.ie/chemistry

Cell and Molecular Analysis

CYTOMETRY

- Circulating biomarkers
- Cell fate and function (cell cycle, apoptosis, proliferation)
- Platelet activation
- Cellular characterisation and enumeration
- Cell isolation
- Rare cell characterisation (eg. circulating progenitor cells)

Dr. Ronan Murphy
www.preventivemedicine.ie

TRANSCRIPTOMICS AND EPIGENETICS

- Epigenetic profiling
- Focused pathway analysis and bioinformatics
- microRNA profiling

Dr. Ronan Murphy
www.preventivemedicine.ie

Computer Modelling

COMPLEX SYSTEMS MODELLING AND ANALYSIS

- Artificial Intelligence
- Computational models of spatiotemporal processes in physical, biological and related systems
- Statistical modelling applications in the natural and medical sciences including;
  - > Bacteria - antibiotic interaction
  - > Multiple infection network and immune modelling
  - > Drug dissolution modelling
  - > Theoretical analysis of drug delivery and drug delivery systems
  - > Computational epigenetics: modelling and analysis

Prof. Heather Ruskin
Dr. Martin Crane
Ray Walshe
www.computing.dcu.ie
www.sci-sym.dcu.ie

Human Performance

HEALTH AND HUMAN PERFORMANCE

- Eccentric Exercise
- Optimising sport technique
- Human locomotion
- Health promotion through innovation
- Athletes' injury and medical management
- The regulation of energy expenditure
- Effects of acute and chronic exercise on vascular health in patients with:
  - > coronary artery disease
  - > peripheral arterial disease (PAD)
  - > heart failure (HF)
  - > metabolic syndrome

Dr Catherine Woods
Dr Davide Susta
Dr Donal O'Gorman
Prof. Niall Moyna
Dr. Kieran Moran
www4.dcu.ie/shhp

Medical Devices

MATERIALS

- Semi-solid material processing
- Composite materials processing
- Laser material processing
- Material property characterisation

- Advanced processes to improve functionality of biomaterials

- Polymer and hydrogel processing
- Thermal spraying surface engineering
- Powder processing

- Degradable polymers (polyesters, polypeptides) for hydrogels and drug delivery
- Bioconjugated porous polymers as scaffolds and for bioseparation

- Bioabsorbable implants
- Medical applications of magnesium alloys

Dr. Dermot Brabazon
Dr. Lisa Looney
Dr. Garrett McGuinness
www.medeng.dcu.ie

Dr. Finbarr O'Sullivan
www.dcu.ie/biotechnology
www.nicb.dcu.ie

Dr. Andreas Heise
www.dcu.ie/chemistry

Dr. Bryan Mac Donald
www.medeng.dcu.ie

MODELLING AND DESIGN

- Casting
- High shear rate and temperature rheology
- Non-contact topography characterisation
- Rapid manufacturing

- Finite element analysis
- Design manufacturing Processes

- Computation modelling of the in-service behaviour of medical devices
- Finite element modelling
- Soft tissue testing and constitutive modelling
- Design and development of orthopaedic medical devices
- Ultrasonic medical device technology

Dr. Dermot Brabazon
Dr. Garrett McGuinness
Dr. Catriona Lally
Dr. Bryan Mac Donald
Dr. Joseph Stokes
www.medeng.dcu.ie

MICROFLUIDICS

- Integrated lab-on-a-chip technologies
- Comprehensive polymer microfabrication facility for rapid and cost-efficient prototyping
- Integration of particulate/monolithic stationary phases into microfluidic platforms

Prof. Jens Ducree
www.bdi.ie

Dr. Mercedes Vazquez
www.separationscience.ie

Protein Engineering

ANTIBODIES

- Antibody production and antibody engineering
- Investigation of protein-protein interactions
- High-throughput screening

Prof. Richard O'Kennedy
Dr. Stephen Hearty
Dr. Paul Leonard
www.dcu.ie/biotechnology
www.bdi.ie

GLYCOPROTEINS

- Purification and analysis
- Cloning and mutagenesis of bioligands

Dr. Brendan O'Connor
www.dcu.ie/Biotechnology

LECTINS

- Cloning and expression of novel lectins
- Development and recombinant production of carbohydrate binding proteins
- Integration of CBPs into novel glycoanalytical platforms
- Immobilisation of lectins on novel stationary phases to enhance the speed, resolution and effectiveness of the glycoprotein separations
- Protein-protein interactions
- Bacterial lectins

Dr. Brendan O'Connor
Dr. Paul Clarke
Dr. Michael O'Connell
Roisin Thompson
www.dcu.ie/Biotechnology

ENZYMES

- Enhancing enzymes' fitness-for-purpose by chemical modification and by mutational protein engineering and protein stabilisation
- Exploiting horseradish peroxidase (HRP) as a multipurpose protein trypsin and other proteases "in reverse" for enzymatic peptide synthesis

Dr. Ciaran Fagan
Dr. Michael O'Connell
www.dcu.ie/Biotechnology

Nanotechnology

NANOPARTICLE TECHNOLOGY & NANO-MEDICINE

- Nanoparticulate contrast agents for medical imaging transport in conducting materials
- Development of synthetic polymers and polymer grafted nanoparticles
- Bio-conjugation of polymers and nanoparticles
- *In vitro* tests of biomaterials including surfaces and nanoparticles

Dr. Dermot Brougham
Dr. Andreas Heise
www.dcu.ie/chemistry

To find out more about how you could benefit from DCU's expertise and facilities, please contact a member of the Invent team at:

tel: + 353 1 700 7777
www.dcu.ie/invent
Invent, Dublin City University, Collins Avenue, Dublin 9

Invent are proudly supported by:

DCU

AIB

ENTERPRISE IRELAND
where innovation means business

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NATIONAL DEVELOPMENT PLAN

HEA

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EUROPEAN REGIONAL DEVELOPMENT FUND

IDA IRELAND

IRCSET

sfi
science foundation ireland

HRB
Health Research Board