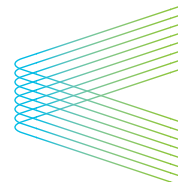


DELIVERING FOR INDUSTRY

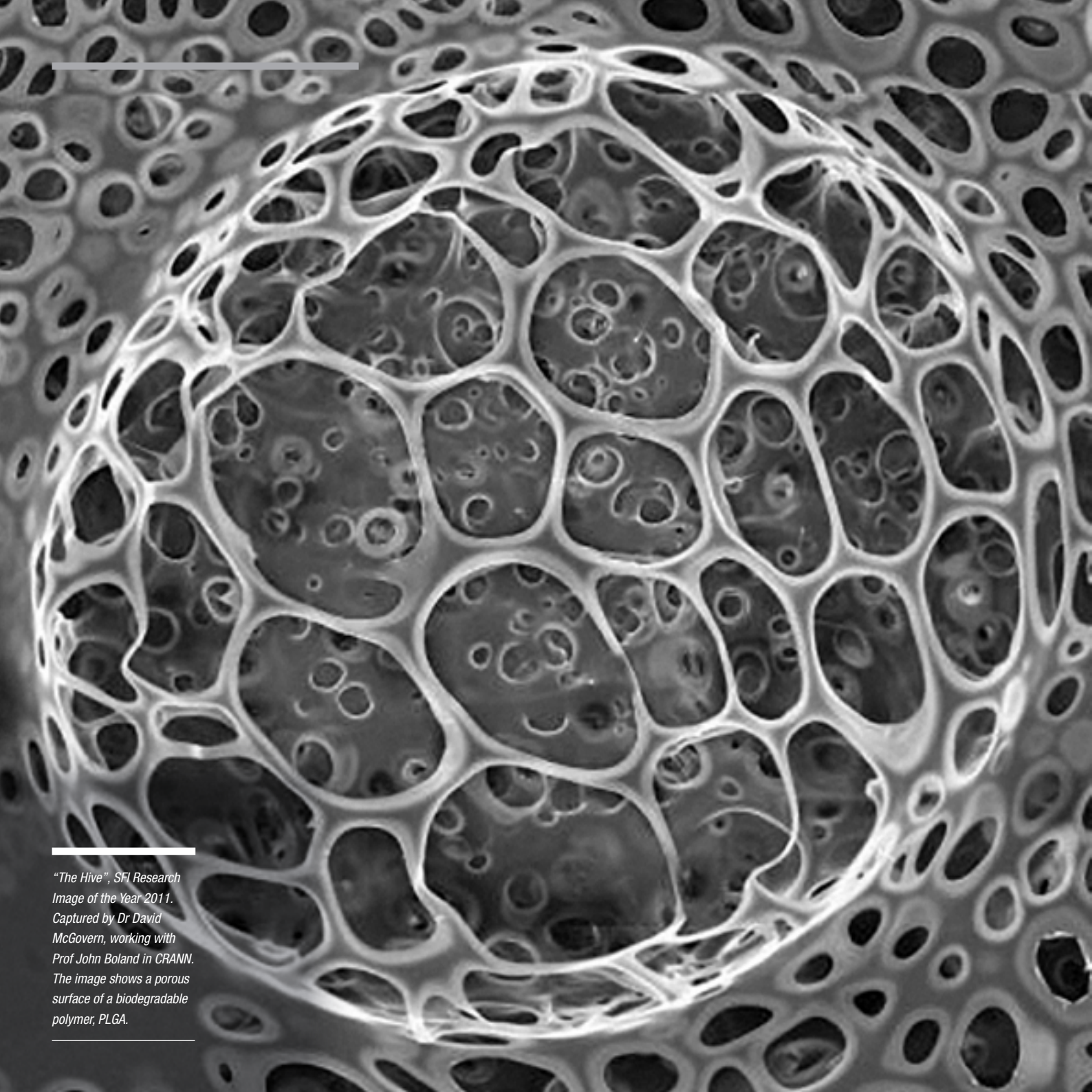


CRANN



Science - Innovation - Impact





“The Hive”, SFI Research
Image of the Year 2011.
Captured by Dr David
McGovern, working with
Prof John Boland in CRANN.
The image shows a porous
surface of a biodegradable
polymer, PLGA.

CONTENTS

Introduction to CRANN	4
Impacting Multiple Sectors	5
Why work with CRANN?	6
Working with Industry	7
IP to Market	8
Commercialisation	9
Case Studies	10
— Thomas Swan – Direct Industry Funded Collaborative Project	12
— Aerogen – Collaborative Centre in Applied Nanotechnology	14
— NAMDIATREAM – European Seventh Framework Programme	16
— Merck Millipore – Enterprise Ireland Innovation Partnership Award	18
— SolarPrint – IRCSET Enterprise Partnership Scheme	20
— Sigmoid Pharma – Enterprise Ireland 50/50 Innovation Voucher	22
— ESB – Industrial Access to Infrastructure	24
— DePuy – Multiple Engagement Strategy	26
Infrastructure	28
Contact	30

INTRODUCTION TO
CRANN

The Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN – www.crann.tcd.ie) is Trinity College Dublin’s largest research institute and one of the flagship investments for the Irish State since it began to strategically support research a decade ago. CRANN is focussed on delivering world-leading research and innovation in the area of material science and nanoscience, to be achieved through extensive proactive collaborations with industry both from a research and commercialisation perspective.

CRANN comprises a team of over 300 researchers from 45 different countries and has two state-of-the-art buildings both custom designed and constructed for the purpose of leading edge materials research. CRANN is the primary driver for Ireland’s ranking of 8th globally over the last decade for material science research.

CRANN research directly impacts technologies and products for the ICT, medical devices, biopharmaceuticals and industrial technology sectors. CRANN has been remarkably successful in building relations with industry. At present, there are active research engagements with over 100 companies in Ireland and Europe.

In addition, CRANN works with smaller indigenous companies to aid in the growth and development of new research activity enterprises. CRANN is committed to innovation and commercialisation, continuously generating new intellectual property for commercialisation. In the last number of years there have been three spin-out companies – Cellix Ltd, Glantreo and Miravex.

CRANN is committed to lowering the barrier for industry to interface with, and critically benefit from, a direct engagement with academia. CRANN has a professional industry interface team dealing with all issues necessary for effective collaborative research programmes and a dedicated intellectual property group to ensure effective protection and commercialisation. Furthermore CRANN has an expert team of technical specialists



Dr. Diarmuid O’Brien
Executive Director, CRANN

Dr Diarmuid O'Brien



Prof. John Boland
Director, CRANN

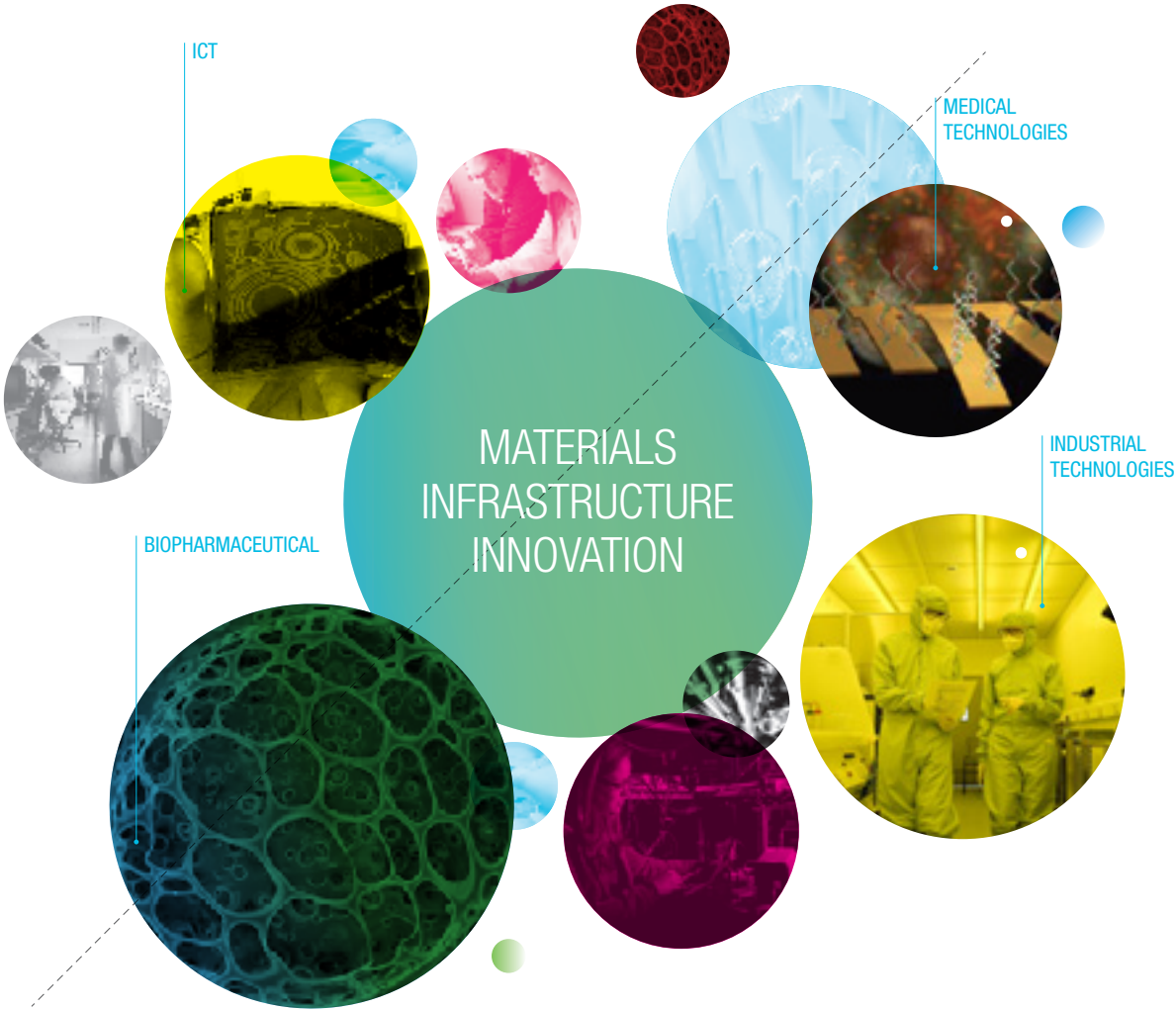
John Boland

with extensive industry and research experience who support the leading infrastructure which greatly supports industrial collaborations.

This booklet is designed to provide a window to industry on the variety of research engagements which are possible in partnership with CRANN, to describe how these engagements are initiated and enabled, and most importantly to demonstrate the clear value return to industry from partnering with CRANN.

We hope all companies will take the opportunity to engage directly with CRANN and find out first-hand how we can support your immediate and long term needs.

CRANN
IMPACTING MULTIPLE SECTORS



WHY WORK WITH
CRANN

CRANN is committed to supporting industry – from SMEs to MNCs, from short term projects to long term on-going collaborative projects. In a national or international context, we work collaboratively with industry stakeholders and agencies to share infrastructure and expertise, tackle medium term research problems, or address grand challenges in ICT, Medical Devices, Biopharmaceuticals, or Advanced Manufacturing.

Problem Solving & Manufacturing Support

Combine CRANN's state of the art equipment and expertise in post measurement analysis to solve your manufacturing problems or simply analyse your materials.

Knowledge Transfer

Embed your Industrial R&D researchers in CRANN for full access to CRANN's infrastructure and PI mentorship. CRANN researchers can also be seconded to industry to transfer project knowledge.

Flexible Engagement Model

Take advantage of CRANN's open engagement model which can be tailored to meet your companies requirements. Research can be collaborative to enhance your in house R&D capabilities or contract.

Proven Track Record

Leverage CRANN's expertise. CRANN have actively engaged with over 100 industry partners from a range of industry sectors including ICT, Biopharma, Medtech and Advanced Materials.

Technical Expertise

Harness the expertise of CRANN's multi-disciplinary research groups to solve your industry problem statement with direct access to world leading Scientists and Engineers.

Technology Licencing

Access an array of technologies available for commercial exploitation.

Funding and Grant Application Support

Exploit CRANN's expertise and knowledge in funding opportunities to help you identify and apply for the appropriate support funding to finance your project.

State of the Art Analytical Equipment

Access a professionally managed suite of high end analytical equipment and technical experts without the depreciation or running costs.

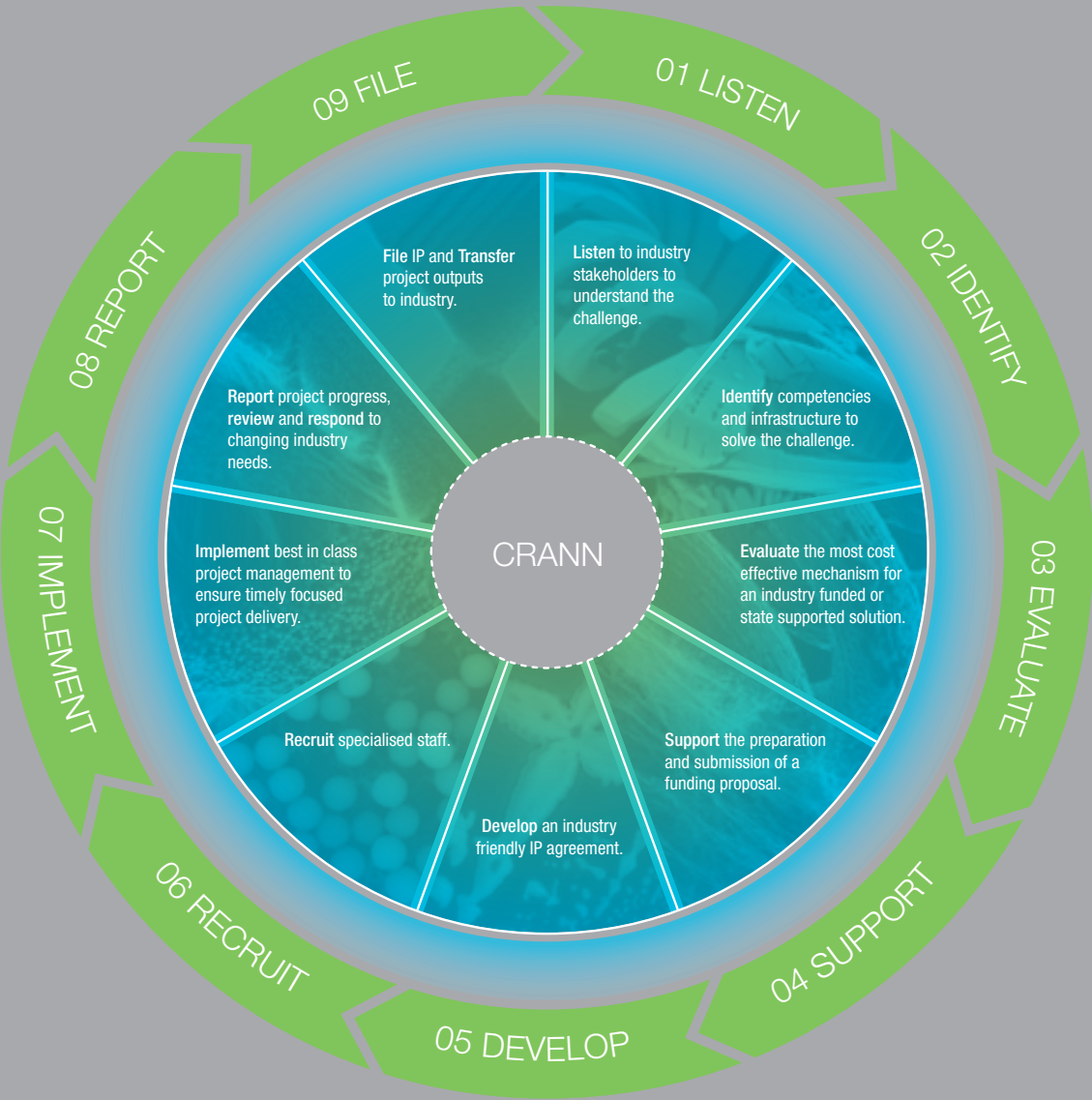
Project Management

Utilise CRANN's industry support team and dedicated project managers to coordinate all aspects of your engagement.

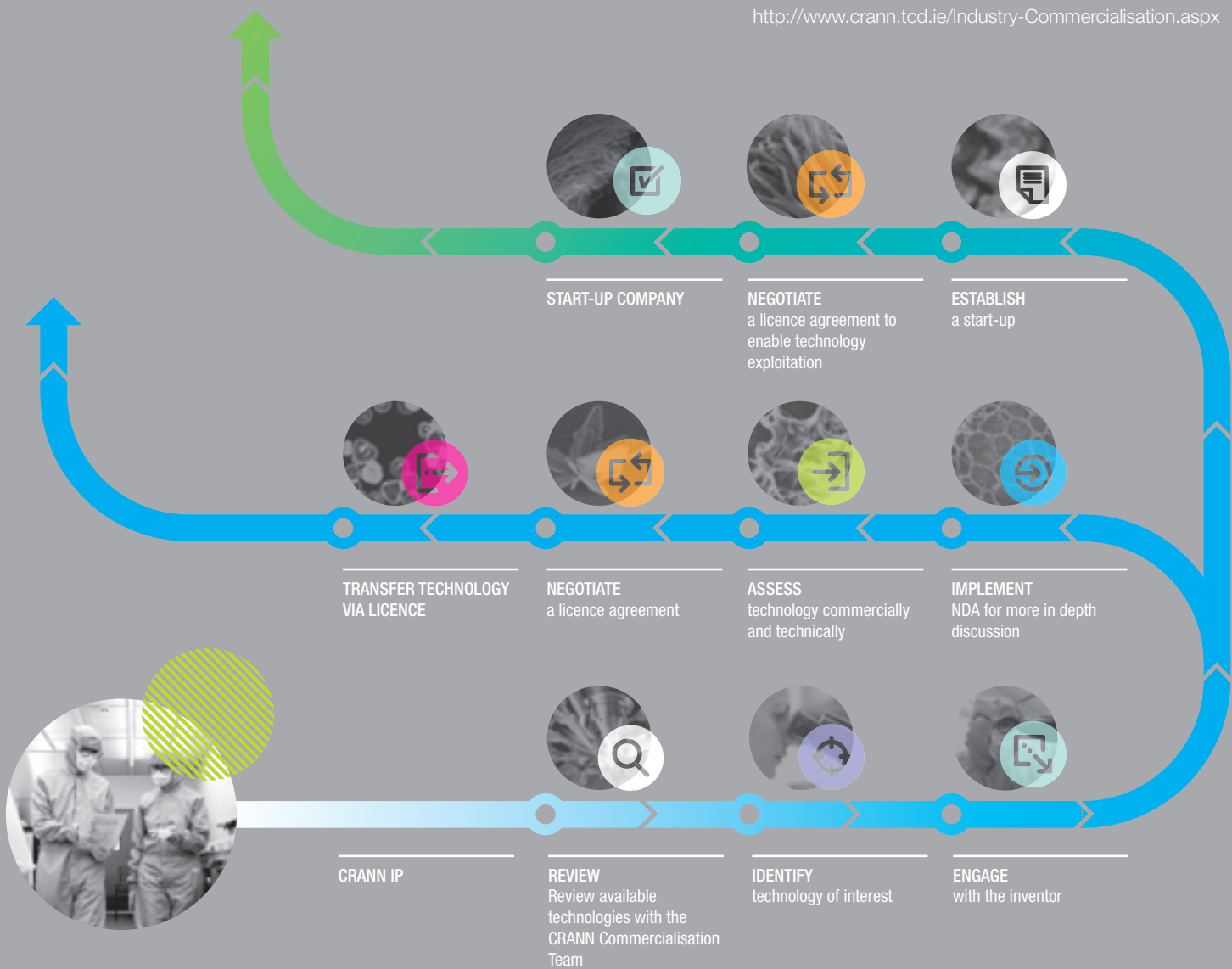
Access to EU Project Development

Access CRANN's dedicated EU funding specialists and a platform for EU project development and partners search.

CRANN
WORKING WITH INDUSTRY



IP TO MARKET

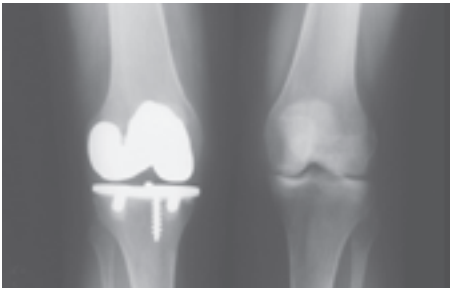


CRANN COMMERCIALISATION

CRANN Technologies available to Industry
The CRANN commercialisation team promotes the exploitation of existing CRANN IP via licencing to established or start-up companies. CRANN has a portfolio of technologies, in sectors such as semiconductors, medical devices, energy and novel manufacturing. We work with companies and entrepreneurs in developing technologies with commercial potential.

Licensing

There is an experienced team in CRANN and in the Technology Transfer Office (TCD & UCC) to support licensing activity. CRANN has completed a number of technology transfers to both SMEs and MNCs in Ireland and abroad. The CRANN team are very experienced in understanding company requirements, supporting grant applications and project managing to key deliverables. CRANN works proactively with industry experts who can help direct the route to market or suggest companies that may be interested in CRANN technologies.



Creating a Start-up Company






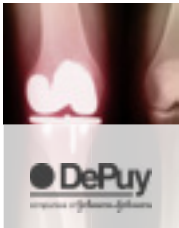
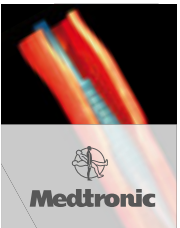

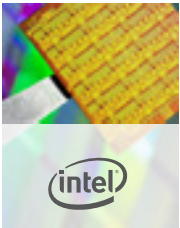

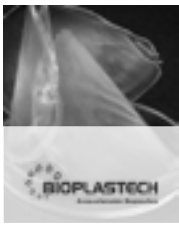



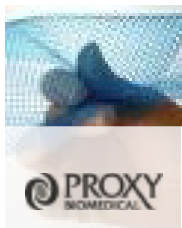




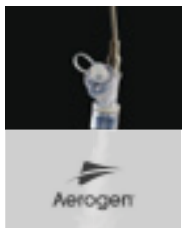
Many of the technologies developed at CRANN are platform in nature and have broad applications with substantial market opportunities. CRANN strongly welcomes experienced entrepreneurs who wish to use their skills and expertise to create High Potential Start-up (HPSU) companies. Typically CRANN PIs prefer to support rather than to lead the start-up process, hence there is a requirement for highly experienced and motivated entrepreneurs. The CRANN Commercialisation team and the Technology Transfer Office are experienced with start-up creation and are available to support key tasks such as:

- Market and technical research
- Marketing products and services
- Sourcing funding
- Drafting business plans
- Recruiting key team members.

CRANN has an active Entrepreneur in Residence model to support the creation of start-up companies. We provide access to market research tools and databases, and support entrepreneurial activity with state of the art infrastructure and facilities. The Technology Transfer Office provides extensive support with intellectual property and contract negotiation.

Ireland is recognised as one of the best places in the world to establish a company, with very favourable legal and tax regimes. This has been proven with some of the top companies in the world from the medical devices, biopharmaceuticals and ICT sectors establishing a base in Ireland. In addition, Ireland has many government supports for start-up companies including access to funding, mentoring and networking and international trade missions.

CASE STUDIES

HOW TO WORK WITH CRANN

CRANN partners with a wide range of clients across a diverse range of industrial sectors. Engagement modes vary and are tailored to meet your company’s requirements.

METHODS OF ENGAGEMENT

COLLABORATIVE RESEARCH
Enhance your in-house R&D capabilities through collaboration with CRANN’s world leading material scientists and access to CRANN’s state of the art infrastructure.

TECHNOLOGY LICENSING
The identification, protection and commercialisation of intellectual property developed at CRANN is an important part of the Institute’s activity.

CONTRACT RESEARCH
Harness the expertise of CRANN’s multi-disciplinary research groups to solve your industry problem statement.

PRODUCT & PROCESS DEVELOPMENT
Combine CRANN’s world leading material science capability and its enabling infrastructure to support you in enhancing your manufacturing processes and products.

ADVANCED MANUFACTURING SUPPORT
Combine CRANN’s state of the art equipment and expertise in post measurement analysis to solve your manufacturing problems or simply analyse your materials.

CRANN proactively works with companies to identify and apply for the appropriate funding for projects.

THOMAS SWAN

INDUSTRY PROBLEM STATEMENT

Thomas Swan & Co. Ltd. is a leading independent manufacturer of performance and speciality chemicals, manufacturing over 100 commercial products. With activities in the USA and China and a global network of distributors, Thomas Swan exports to over 80 countries worldwide.

Graphene is well recognised as the wonder material of modern science and was the focus of the Nobel Prize in 2010. It has unique properties and is both the strongest and most conductive material known to man. Potential applications for graphene are wide ranging and include next generation electronic devices, mechanically strengthened plastics and new thermoelectric materials.

Production of pristine, high quality graphene on an industrial scale is a significant challenge to industry. The development of a graphene manufacturing process is the latest venture for Thomas Swan's Advanced Materials Division which already manufactures industrial grades of single-wall carbon nanomaterials.

CRANN VALUE ADD

CRANN PI Professor Jonathan Coleman and his team have published a number of papers and patents on the exfoliation of graphene and other 2D materials. Thomas Swan has funded an industrial focussed research project collaborating with CRANN and utilising Prof Coleman's expertise in the field of graphene production to develop methods to produce high quality pure graphene on an industrial scale.

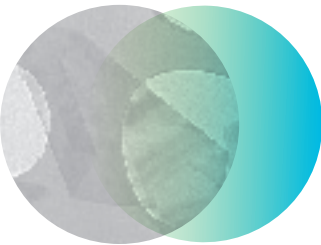
Thomas Swan has placed a processing engineer in CRANN to work full time with Professor Coleman's team for two years. Embedding a researcher in residence with CRANN ensures the programme is continually aligned to the company's strategy and also provides Thomas Swan oversight on the full portfolio of research within CRANN allowing them to ascertain if these technologies would be of value to the company. This partnership is a model for how world leading technology developed by academia can be identified and commercially exploited to provide both economic and societal benefit.

CRITICAL CRANN ENABLERS

- Materials knowledge and expertise.
- Synthesis, processing and advanced characterisation of nanomaterials.
- Mechanical, optical and electrical testing of nanomaterials.
- Training of industry staff and the transfer of commercially valuable knowledge.
- Advanced microscopy for materials characterisation.

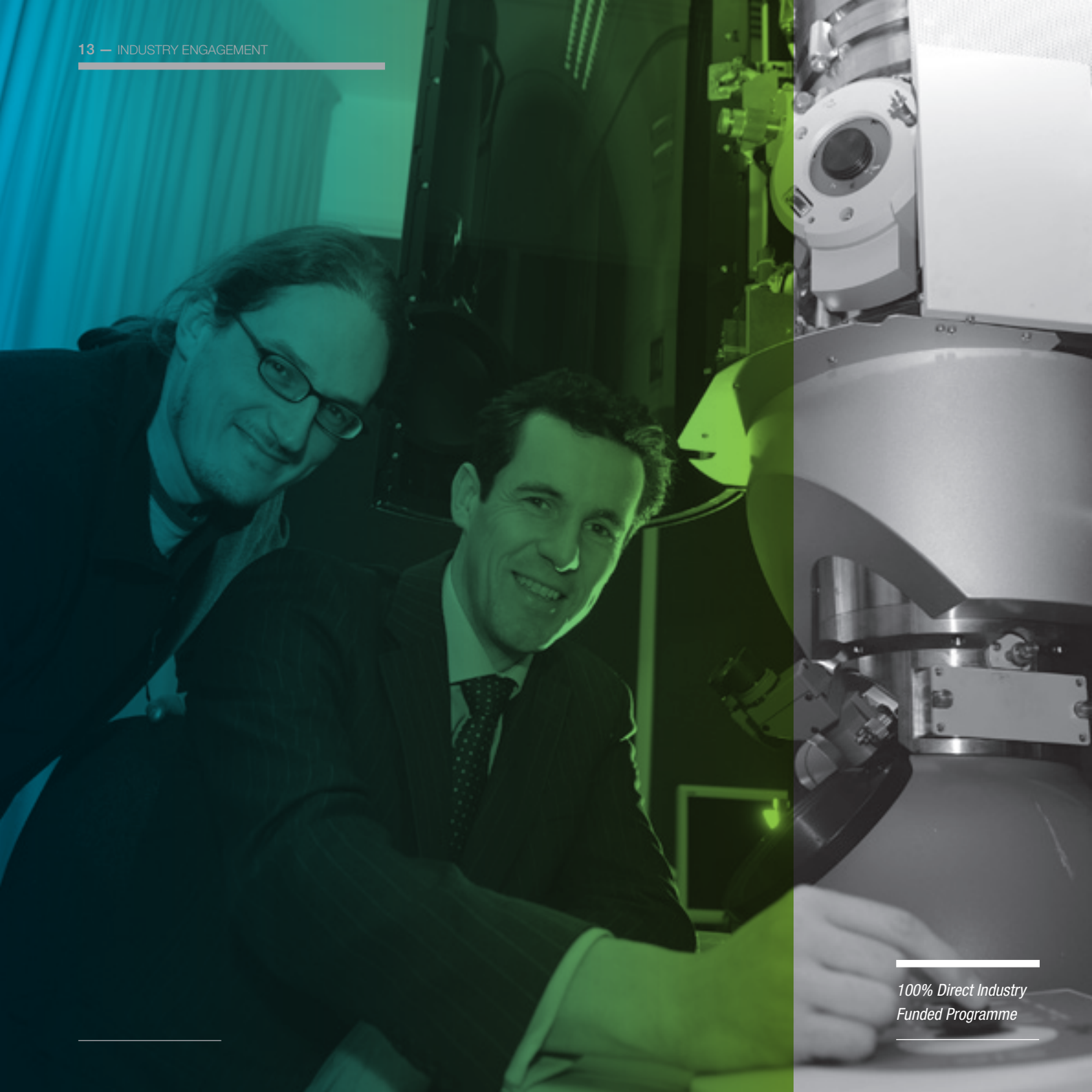
ENGAGEMENT TYPE

Direct Industry Funded Collaborative Project. Direct industry funded projects give the company a strong voice in collaborative or contract research projects and bypass the need to wait for funding calls.



“We are delighted to be working with CRANN and Trinity College Dublin on such an exciting project... I look forward to developing a scalable production route of true, high purity graphene”

Harry Swan, Managing Director, Thomas Swan



AEROGEN

INDUSTRY PROBLEM STATEMENT

Aerogen is a specialty medical device company dedicated to improving therapeutic options and to reducing the cost of care for patients with respiratory disorders and lung cancer in critical care settings. Aerogen's Research and Development team are continuously looking to evaluate and acquire new technology, open new markets and complement the company's future business by linking with technologies that advance their Nebulisation technology.
www.aerogen.com



CRANN VALUE ADD

A team of CRANN researchers from TCD's schools of Physics and Medicine and researchers from UCC's School of Pharmacology have developed new magnetic core shell anti-cancer drug loaded nanoparticles, which are compatible with Aerogen's nebulizer technology. In vitro and in vivo validation of nanoparticles and drug release systems show excellent biocompatibility of the nanoparticulate systems which are targeting various theranostic [combined therapeutic and diagnostic] applications.

CRITICAL CRANN ENABLERS

- Strong collaboration via a multidisciplinary research team.
- Synthesis, targeted functionalisation and vectorisation of nanoparticles.
- High content biological screening and in vitro diagnostics.
- Biocompatible polymer and composite formation.
- Cell biology and Immunology.

“The innovative nanocarrier product will generate a range of opportunities with a view to establishing new partnerships and collaborations between Aerogen and relevant pharmaceutical, medical device and commercial product companies.”

Alan Hynes, CCAN Executive Director

ENGAGEMENT TYPE

CCAN Project (Collaborative Centre for Applied Nanotechnology)

CRANN co-hosts CCAN with the Tyndall National Institute. This centre was established to support Irish-based companies accelerate commercialisation of nano-enabled products. CCAN coordinates industry-led projects incorporating research expertise from across the island of Ireland. This project, spearheaded by CRANN, involved collaborations with DCU, Tyndall and UCC's School of Pharmacy. The CCAN network offers nanoscience and nanotechnology expertise to assist companies like Aerogen with short to near-term process or product development. CCAN is supported by its members companies, IDA Ireland and Enterprise Ireland. More information on CCAN can be found at www.ccan.ie.



NAMDIATREAM

INDUSTRY PROBLEM STATEMENT

Over 3.2M new cancer cases and 1.7M cancer-related deaths are registered in Europe every year. Current diagnostic methods are not sensitive enough, limiting their potential for early disease identification. Earlier detection and more precise diagnosis of disease will provide patients with the correct therapies at an earlier stage in the disease development. New innovations in nano medicine can help to reduce morbidity and mortality in the 21st century by the early detection, monitoring and fast treatment of chronic disease.

NAMDIATREAM is a 13 million euro, large scale European Union framework programme of which €3.9M will be directly invested in Ireland. It brings together an international consortium of 7 high-tech SMEs including Irish SME's Cellix Ltd and Radisens Diagnostics Ltd, 2 multinational companies (Becton Dickinson, Europe and Nikon Instruments, France), 12 academic institutions and 1 technology transfer company. Researchers from CRANN and TCD's School of Medicine are leading the technical programme and have

overall responsibility for coordinating the programme. NAMDIATREAM aims to provide new knowledge and expertise for industrially relevant nanotechnology applications in the early diagnosis and imaging of cancer.

CRANN VALUE ADD

NAMDIATREAM was formed to develop a nanotechnology based toolkit to enable early detection and imaging of molecular biomarkers for the most common cancer types and of cancer metastases, as well as permitting the identification of cells indicative of early-stage disease onset. The project is built on the innovative technology concepts of super-sensitive "lab-on-a-bead", "lab-on-a-chip" and "lab-on-a-wire" nano-devices. CRANN PI Prof. Yuri Volkov coordinates the consortium and brings expertise in the areas of nanotoxicology and nanomedicine. Prof. Coey [School of Physics] and Prof. Gun'ko [School of Chemistry] bring expertise in magnetic and non-magnetic probes, nanomagnetism, nanowires and nanoparticles.

CRITICAL CRANN ENABLERS

The programme will build upon a wide range of CRANN nanomaterial sets, utilise CRANN's advanced microscopy analysis

suite and access infrastructure including the Irish National Centre for High Content Screening and Analysis (INCHSA) in St. James' Hospital.

ENGAGEMENT TYPE

European Seventh Framework Programme for Research and Technological Development

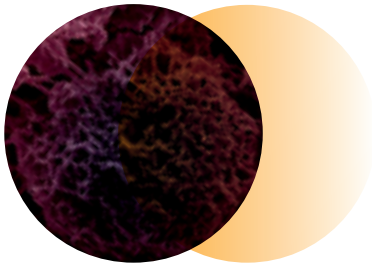
The Project is co-funded by the European Seventh Framework Programme for Research and Technological Development under the Nanosciences, Nanotechnologies, Materials and new Production Technologies area. CRANN has a dedicated FP7 Officer, Tony Flaherty, tflahert@tcd.ie, to support industry accessing FP7 consortia.

“NAMDIATREAM project represents an example of close collaboration between the leading European Academic, Research Institutions and industrial partners both at the levels of SME and top world class multinational companies”

*Dr Adriele Prina Mello,
NAMDIATREAM Deputy Coordinator.*



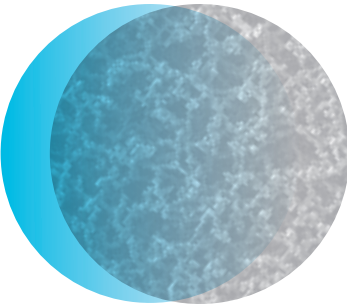
Bringing Irish Companies into Europe – Enabling Access for Irish SME's to Win Over €2.25M of EU Funding



MERCK MILLIPORE

INDUSTRY PROBLEM STATEMENT

Merck Millipore is a world leader in the production of membrane for biopharmaceutical and industrial applications and is looking to develop new membrane technology. Currently, natural polymers such as nitrocellulose are used in the production of a number of membrane products. The large scale production of nitrocellulose membrane is technically challenging. New processing methodologies, advancements in materials understanding and availability of new material sources are key considerations that Merck Millipore wishes to address in continual partnership with CRANN.



CRANN VALUE ADD

In this project, CRANN researchers based in UCC and TCD used their expertise to develop a new membrane using a synthetic polymer, with comparable or superior performance to the current nitrocellulose membrane product, resulting in the generation of new intellectual property. CRANN researchers spent time working at the Merck Millipore manufacturing facility in Cork and at the company’s research and development facility in the USA. Processing and development engineers worked in CRANN laboratories to gain new skills in materials characterisation and process optimisation. Following on from this success, a second project was co-funded to bring the product within Merck Millipore’s specifications.

The success of this engagement clearly demonstrated the benefits of this type of collaborative partnership with Irish research institutes to Merck Millipore locally and at their global research headquarters. Merck Millipore is currently active with CRANN in the areas of new product development,

advanced characterisation methodologies and new materials design.

CRITICAL CRANN ENABLERS

- Materials knowledge and industrial manufacturing processing experience.
- Polymer characterisation and processing techniques.
- Air casting fabrication techniques.
- Surface chemistry and chemical functionalisation capabilities.
- Advanced Microscopy Laboratory.

ENGAGEMENT TYPE

Enterprise Ireland Innovation Partnership. The EI Innovation Partnership Programme can provide up to 80% of the cost of research work to develop new and improved products, processes or services, or generate new knowledge and know-how.

“Merck Millipore believes the materials expertise at CRANN, in partnership with our own in-house membrane knowledge, will enable and support new product development at the Merck Millipore site in Cork”

Liz Henderson, Senior Site Director, Merck Millipore, Cork



Enterprise Ireland Innovation Partnership Delivering Value and Support to Industry in Ireland

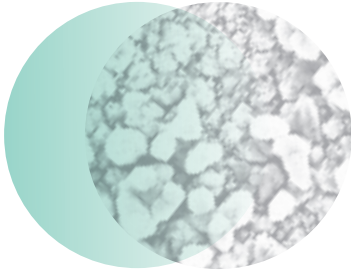
SOLARPRINT

INDUSTRY PROBLEM STATEMENT

There is an urgent need for alternative energy resources due to the rapid rise in the price of fossil fuels and the great danger of increasing greenhouse effect caused by carbon dioxide emissions. SolarPrint Ltd in Dublin has developed and patented technologies which can produce energy, not just from the sun, but from any internal light source in a building. Specifically, the company develops dye sensitised solar cell (DSSC) technology – the next generation of photo-voltaic technology – which involves the production of cost effective power-generating solar cells that can be printed and applied to a range of different surfaces. One of the key challenges during development is in the materials selection and processing method to achieve high cells energy conversion efficiency i.e. in maximising power output of the indoor DSSC product in a scalable way.

CRANN VALUE ADD

CRANN’s infrastructure and leading expertise in advanced microscopy techniques helps SolarPrint to gain in-depth characterisation of the structural and compositional features of the DSSC cell. An understanding of the energy loss mechanism in terms of responsible microstructural and compositional features of the cell was essential in order to direct further development of this technology to maximise power output. CRANN characterised cells manufactured via different processes using a range of advanced microscopy techniques. Access to CRANN’s Helium-ion microscope, of which there are less than twenty in the world, was instrumental in understanding the interfaces and physical structure of the cell. In this programme, working in close cooperation with SolarPrint design engineers, the structural and compositional variations responsible for energy loss mechanisms were identified. SolarPrint used the information gained from the project to optimise and modify their cell design and manufacturing process. IP following on from these programmes will strengthen their IP portfolio.



CRITICAL CRANN ENABLERS

- Sourcing of skilled research graduates.
- Leading expertise on-site in CRANN in advanced microscopy techniques.
- Access to the Advanced Microscopy Laboratory particularly the Helium Ion Microscope.

TYPE OF ENGAGEMENT

This project was funded by the IRCSET (Irish Research Council for Science, Engineering and Technology) Enterprise Partnership Scheme. IRCSET provides industry with flexible and easy access to an exceptional pool of competitively selected, high calibre researchers and funding for up to 70% of the project costs.

“SolarPrint has developed a strong relationship with CRANN over the last 3 years and have identified CRANN as a key partner with the infrastructure, advanced characterisation tools and know-how available to support us in the development of our Dye-Sensitised Solar Cells (DSSC)”

Dr. Mazhar Bari, CTO, Solarprint



State Funded Industry Academia
Programmes Generating Intellectual
Property to Benefit the SME

SIGMOID PHARMA

INDUSTRY PROBLEM STATEMENT

Sigmoid Pharma Limited is a specialty pharma product development company headquartered in Dublin, Ireland. The company leverages its proprietary SmPill® oral drug delivery platform to facilitate reduced-risk, innovative, patentable product development. Sigmoid’s goal is to identify and create novel therapeutic opportunities that address unmet clinical needs. By applying SmPill® technology to existing therapeutics, Sigmoid works to improve the safety and/or efficacy of such therapeutics for existing or new uses in a range of diseases, focusing on gastrointestinal disease. SmPill® technology has demonstrated potential in the oral delivery of vaccines and peptides. Sigmoid’s lead product, CyCol®, has completed a Phase II study in ulcerative colitis.

To enable the development of stable, reproducible and scalable products, Sigmoid needs a range of characterisation methods to gain a greater understanding of their novel manufacturing processes.



CRANN VALUE ADD

The expertise of CRANN’s dedicated technical staff in combination with access to CRANN’s Advanced Microscopy Laboratory and extensive material characterisation suite resulted in the development of a range of methods to characterise the SmPill® core, the surface and coating layers.

CRANN’s Focused Ion Beam (FIB) microscope was used to prepare cross sections of the SmPill® bead. The cross sections were analysed by SEM (Scanning electron microscope) and the interfaces and interactions occurring within the different coating layers were investigated. Energy Dispersive X-ray (EDX) analysis provided detailed qualitative and quantitative compositional information for each layer. A range of beads with various drug/coating permutations were analysed to provide precise specific surface area evaluation.

The methods developed with CRANN supported Sigmoid in the development of improvements to their manufacturing process.

CRITICAL CRANN ENABLERS

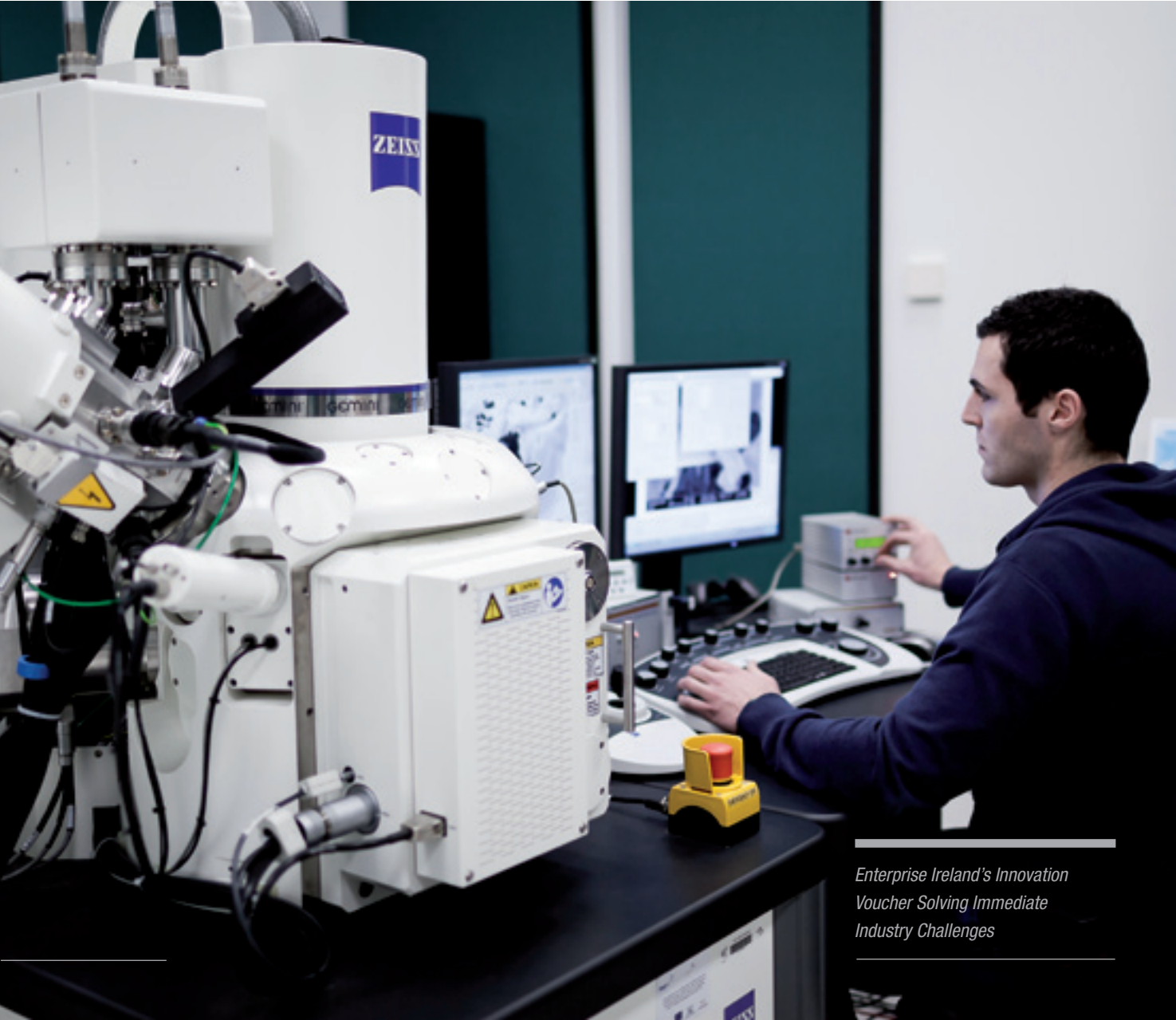
- Proven expertise in advanced microscopy techniques and soft materials characterisation.
- Access to the Focused Ion Beam microscope and highly trained technical staff.
- Access to the Scanning Electron Microscope and Energy Dispersive X-ray analyser.
- Polymeric material analysis and Spectroscopy.

TYPE OF ENGAGEMENT

This project was co-funded by Enterprise Ireland under a 50/50 innovation voucher. The 50/50 innovation voucher scheme provides industry with funding of up to 50% (€5k) towards the costs of contract research projects employing an academic partner. Innovation vouchers are accessible to any SME, and SME consortia on the island of Ireland for engagements with an academic institute in order to answer a specific well defined knowledge question. [Contact colm.faulkner@tcd.ie for further details about EI voucher scheme].

“Understanding the interaction between the coating and the underlying SmPill® technology was critical to the development and knowledge of the SmPill® technology and supported Sigmoid in identifying process improvements for consistent manufacturing and scale up”

Dr. Ivan Coulter, CEO, Sigmoid Pharma



Enterprise Ireland’s Innovation Voucher Solving Immediate Industry Challenges

ESB

INDUSTRY OPPORTUNITY

An efficient energy strategy and lowered carbon emissions are key global challenges of the 21st century. ESB own, operate, maintain, invest in and build power stations nationally and internationally. Power plants operate at high temperatures and pressures and require materials capable of tolerating these conditions. It is essential that ESB's power generation assets are operating efficiently, however failures occur from time to time. ESB needs to identify and understand these failure mechanisms in order to prevent future failures occurring. Microscopy and materials analysis are central to this need. ESB also provides an engineering consultancy service and has specialist personnel in the materials and chemistry areas of power plants.

CRANN VALUE ADD

CRANN has long term energy related research programmes in new solar-cells/ super-capacitor devices, and a computational programme dedicated to energy related materials.

CRANN has deep expertise in the Physical Sciences, which has been applied to developing large scale renewable energy/ infrastructure projects. This knowledge supports Energy/Utility companies in testing of materials for power station and infrastructure solutions.



Many of CRANN's technical staff have been recruited from blue-chip multi-nationals, and have the experience and knowledge to translate an industry need or problem statement into a "real-world" solution, on a commercially oriented time scale.

Rather than making a significant capital investment in its own instruments, ESB has entered into an arrangement with CRANN whereby staff can access their facilities as required. Access to CRANN infrastructure and expertise enables companies like ESB to test power plant materials, to assist in root cause failure investigations and to engage in longer term R&D in a cost-effective manner. ESB has a long history of conducting these investigations in house and see the CRANN facilities as essential to maintaining this expertise. In addition, the relationship with CRANN allows ESB to draw on the expertise resident both within CRANN and in the wider university structure.

ESB has been working effectively with CRANN for the past two years and sees this relationship continuing in the future.

“ESB has identified CRANN as a key partner in providing the infrastructure, advanced characterisation tools and industry experience to support our businesses.”

Dr. Fionn Griffin, ESB

CRITICAL CRANN ENABLERS

- Structured training courses, from industry experienced experts, to meet the needs and requirements of engineers and material scientists from an industrial perspective.
- Critical mass of high resolution imaging and materials testing equipment for a one-stop-shop solution to an industry problem.
- High specification microscopy research infrastructure, such as scanning electron microscopes [SEM], for high resolution, high throughput materials testing and qualification.

TYPE OF ENGAGEMENT

Industrial access to infrastructure.

Companies can work with CRANN to access structured hands-on training programmes and on-going support and consultancy for company employees performing advanced materials screening, analysis and characterisation.

Self Solving Materials Problems with Direct User Access and Support to High End Analytical Equipment

DEPUY

INDUSTRY PROBLEM STATEMENT

Orthopaedic devices such as hip and knee implants have and continue to make a dramatic contribution to the quality of life for millions of patients globally. DePuy partners with CRANN to develop materials based solutions for their next generation of medical implant materials. Implant materials are carefully chosen to improve performance, reduce failure/fatigue and so increase the lifetime of the device. Moreover, CRANN provides state-of-the-art surface characterisation technologies that will allow a better understanding of the performance of current materials, allowing DePuy to identify opportunities for the improvement of the life span and the biocompatibility of their next generation products.



CRANN VALUE ADD

The interaction between an orthopaedic implant at a cell/tissue interface is a surface phenomenon. Surface properties and material selection play major roles in determining both the biological response to the implant and the material response to the physiological condition. Therefore, it is vital that the nature of the implant surface in terms of process material and cleanliness specification at each distinct manufacturing step is (i) well understood, (ii) optimised for best performance and (iii) characterised systematically.

CRANN researchers at UCC and TCD, have strong competencies and extensive experience in using chemical functionalization methods and super critical fluid based processes for developing surface coatings and effective surface treatments. The institute also has expertise in the engineering of biomaterials for device and implant applications, coupled with capability for advanced materials testing and characterisation of coatings down to the nanoscale.

CRITICAL CRANN ENABLERS

- Expertise in Super critical fluids (SCF) and chemical functionalisation.
- Surface preparation, patterning and film deposition techniques.
- Advanced surface characterisation techniques.
- CRANN Researchers available to work directly with DePuy's manufacturing engineers.

TYPE OF ENGAGEMENT

CRANN engages with DePuy via schemes such as IRCSET, TIDA, the Innovation Partnership, direct contract work and FP7. The Technology Innovation Development Award [TIDA], is co-supported by Science Foundation Ireland and funds activity that targets commercially oriented research focused on new technology development.

“CRANN has a strong affiliation with DePuy, working on cutting edge technology in the areas of high performance materials and state-of-the-art characterisation technologies that add a lot of value to the development of new products for DePuy”

Dr. Sonia Ramirez-Garcia, DePuy (Ireland)



Scaling Industry Interactions
Utilising a Portfolio of Engagement
Mechanisms

DIRECT INDUSTRY INFRASTRUCTURE ACCESS

Industry has a continual requirement to access materials analysis techniques to support their current manufacturing processes, undertake failure analysis and for new process/product development. The cost of this type of infrastructure and more importantly, the availability of skilled technical specialists can be prohibitive to SMEs and indeed, the majority of manufacturing focused MNCs. CRANN as a national resource, houses one of the largest hubs of industry accessible R&D infrastructure in Ireland and currently supports over 100 industry clients in accessing rapid characterisation methodologies and analysis toolkits.

The CRANN Central Equipment Facility [CEF] encompasses the Advanced Microscopy Lab [AML], Cleanroom, Nanobio Facility, Polymer Processing Suite, Photonics Lab,

and a range of metrology/spectroscopy techniques. The centre currently services the ICT, Pharmaceutical, Medical Devices, Industrial Technologies and Energy sectors and offers rapid turn-around contract analysis and longer-term contract service agreements to industry.

This facility is professionally managed and supported by core staff with both industrial and academic backgrounds. Industry can either contract the work to specialist staff or have their engineers or scientists trained to directly perform the analysis on-site at CRANN.

“Working with the CEF team we have been able to use and develop advanced analysis techniques that support our product life cycle. This facility provides the rapid feedback that we need to ensure short investigation times.”

Dr Brian Kelly, Director of Product Development and Manufacturing, Eblana Photonics

ADVANCED MICROSCOPY LAB

- Scanning Electron Microscopy (SEM)
- Focused Ion Beam (FIB)
- Transmission Electron Microscopy (TEM)
- Helium Ion Microscopy (HIM)
- Materials Characterisation/Analytics
- Electron Beam Lithography (EBL)

CLEAN-ROOM

- Chemical Vapour Deposition
- Thermal Evaporation –Metals/Insulators
- UV Lithography
- ICP Etcher
- Resist Polymer Spinners
- Laser Mask Writer

POLYMER PROCESSING

- Differential Scanning Calorimetry (DSC)
- Thermo-Gravimetric Analysis (TGZ)
- Dynamic Contact Angie (DCA)
- Electrical Resistivity
- Tensile Testing
- GPC/HPLC/GG-MS/AA
- Laboratory Brabender for polymer processing

METROLOGY/SPECTROSCOPY

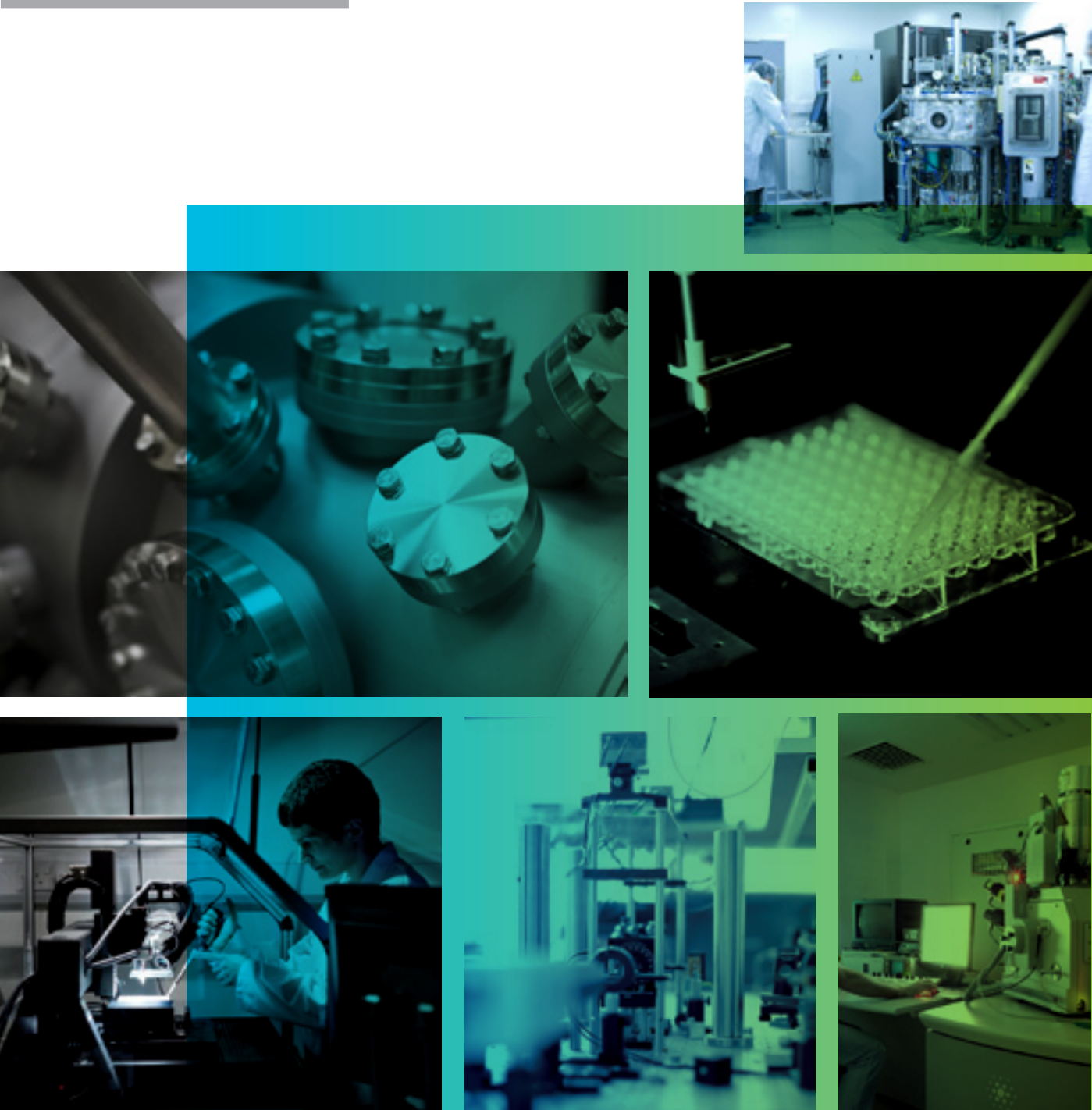
- Fourier Transform Infrared (FTIR)
- X-Ray Diffraction (XRD)
- X-Ray Photon Electron Spectroscopy (XPS)
- Stereo Microscopy and Digital Imaging
- Atomic Force Microscopy (AFM)

PHOTONICS LAB

- Scanning Near-field Optical Microscopy (SNOM)
- Florescence Life Time Imaging (FLM)
- SNOM-RAMAN-AFM platform
- Tunable FS Laser System
- Pulsed Laser Deposition

BIOLOGICAL CAPABILITY

- Cell culturing facilities
- Confocal microscopy
- Half through-put screening lab
 - St James Hospital
- Affiliated with animal test facilities
 - Trinity Bioscience Institute



CONTACT

CRANN Executive Director	Dr. Diarmuid O’Brien	+353 1 896 3089	Diarmuid.obrien@tcd.ie
CRANN Head of Industry Engagement	Dr. Chris Keely	+353 1 896 3028	Chris.keely@tcd.ie
CRANN Commercialisation	Brendan Ring	+353 1 896 3088	Brendan.ring@tcd.ie
European Union Program Officer	Tony Flaherty	+353 1 896 3016	Tony.flaherty@tcd.ie
Communications & Education Manager	Mary Colclough	+353 1 896 3022	mary.colclough@tcd.ie



CRANN Trinity College Dublin, Dublin 2, Ireland

AML Unit 27—29, Trinity Enterprise Centre,
Grand Canal Quay, Dublin 2, Ireland

www.crann.tcd.ie

DIRECTIONS: From College Green: CRANN is located at the far East end of campus on the corner of Pearse Street and Westland Row.

From CRANN: Walk towards Grand Canal Docks for approximately 10 minutes. Once at Grand Canal Quay, turn right and enter through security gate on right.

By Luas: Take the Red line to the Spencer Dock Stop, cross the Liffey using the Samuel Beckett Bridge to Pearse St, Grand Canal Quay.

By Dart: Grand Canal Dock Station or Pearse Street Station.

SEM image – carbon nanotube
polyaniline nano fibre composite
Prof. J. Coleman Group & Prof. D.
Diamond (DCU)

CRANN,
Trinity College Dublin,
Dublin 2, Ireland

+353.1.896 3030
+353.1.896 3037
crann@tcd.ie

www.crann.tcd.ie

