

NEWS UPDATE

www.sspc.ie



Sustainability



Small Molecule



Large Molecule



Health



Education & Public Engagement

societal goals

SSPC celebrates award winners at annual symposium

A very successful symposium was held again this year at University of Limerick, on June, 2024. There was a big focus on SSPC's Early Career Researchers, who provided back-to-back sessions in therapies, sustainability and manufacturing/*in silico* and many outputs-in-3 sessions. One of our distinguished speakers delivering a keynote address was **Ronan Kelly**, Indianapolis, US - Director of Protein Expression and Purification, Biotechnology Discovery Research, Eli Lilly. "A Biotech Journey; from Lillypad to Lillypad."



Dr Mark Nolan, SSPC Graduate of the Year, previously Trinity College Dublin, now at Princeton University. Read all about Mark's journey here.



Congratulations to all SSPC winners:

Directors Award, Investigator of the Year: **Associate Prof. Rob Elmes**, Maynooth University
 Directors Award, Mentor of the Year: **Dr Darren Griffith**, RCSI
 Directors Award, Publication of the Year: **Prof. Paul Murphy** and team, University of Galway.
 MUC1 Glycopeptide Vaccine Modified with a GalNAc Glycocluster Targets the Macrophage Galactose C type Lectin on Dendritic Cells to Elicit an Improved Humoral Response in JACS.
 EPE Champion of the Year: **Keith O'Shaughnessy**, UCC, Equality, Diversity & Inclusion Award:
John Downey, UCC, Placement of the Year: **Alice Parkes**, JnJ, UL, Industry collaboration of the Year: MSD, **Prof. Lydia Tajber**, TCD, **Dr Peter Byrne**, UCD, Commercialisation award: NanoComp - **Prof. Sarah Hudson** and team, UL and SSPC Academic Collaboration of the Year: **Associate Prof. Steven Ferguson**, UCD and **Prof. Anne Marie Healy**, TCD.



As we reach our peak celebrating 15 years in business, **Brian Glennon, CTO & Co-Founder APC & VLE therapeutics**, discusses his role in establishing SSPC while Professor of Engineering at University College Dublin. Brian speaks to the vital role of the (bio)pharma industry in Irish economic landscape, and how the importance of relevant research and training of highly qualified graduates is even more vital than when SSPC was originally developed. www.approcess. View video here.

Claire Boles SSPC PhD candidate and Olympian



Congratulations Claire Boles to PhD student based at University College Dublin, who represented Ireland in the Women's Rugby Sevens team for the Olympics in Paris.

Claire works under the supervision of Dr Jessica Whelan and Dr Roderick Jones and in collaboration with Canty. Her research focuses on the development of a Process Analytical Technology (PAT) method, using a PharmaFlow system for real-time monitoring and control of manufacturing processes that improve efficiency, accuracy, and consistency in pharmaceuticals products. [More details here.](#)

Publication Spotlight

'Forecasting vaping health risks through neural network model prediction of flavour pyrolysis reactions'



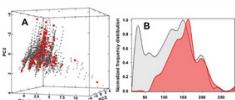
Prof. Donal O'Shea
RCSI

New Royal College of Surgeons Ireland (RCSI) research led by **Prof. Donal O'Shea**, has uncovered the potentially harmful substances in flavoured vapes. His research indicates that when these vapes are heated for inhalation there is the potential for a new wave of chronic diseases.

The delivery of nicotine to the lungs through the inhalation of tobacco smoke has been practiced by mankind for centuries with devastating impacts on public health. Relatively recently, vaping of e-liquids has emerged as a modern variant of this ancient practice of nicotine inhalation. In their original construction, the constituents of e-liquids contained only four chemical entities, nicotine, propane-1,2-diol, propane-1,2,3-triol and water, with the goal of providing a less hazardous means of nicotine delivery than tobacco leaf. Their use as an aid for tobacco smoking cessation has evolved as a cornerstone of some national public health policies, though others have restricted or prohibited their use.

By using AI to simulate the effects of heating all 180 known liquids found in flavoured vapes, the research team identified hundreds of harmful chemicals - including a group of chemicals called volatile carbonyls that are known to be detrimental to human health. **More details here.** The research was carried out in conjunction with IBM Research, Tokyo and was supported by Science Foundation Ireland and the Irish Research Council through the SFI-IRC Pathway Programme for Dr Dan Wu, SSPC alumni.

Publication



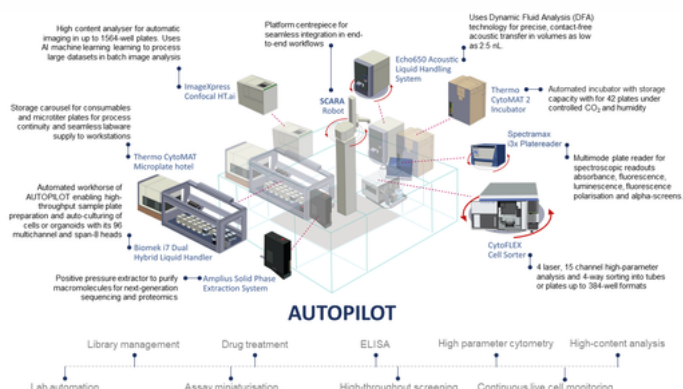
Forecasting vaping health risks through neural network model prediction of flavour pyrolysis reactions, Akihiro Kishimoto, | Dan Wu & | Donal F. O'Shea. (2024) *scientific reports*.

Infrastructure Spotlight

AUTOPILOT, Automated High-Throughput Analysis of Cellular Phenotyping

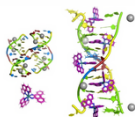


Led by **Prof. Andrew Kellett**, a first in Ireland high-throughput screening core, called AUTOPILOT has been established in DCU. AUTOPILOT provides an automated robotic analysis and cellular phenotyping platform. This facility offers seamless end-to-end workflows in therapeutic and diagnostic research through automated liquid handling, nano volume acoustic transfer, flow cytometry and cell sorting, and high-content imaging with AI machine learning. These automated workflows can deliver comprehensive cell characterisation and profiles of phenotypic states in 2D and 3D systems. More information here.



The AUTOPILOT system will be managed by DCU's Core Technology Team, please contact Una Prendergast (una.prendergast@dcu.ie) for further information

Publication highlight



Probing a Major DNA Weakness: Resolving the Groove and Sequence Selectivity of the Diimine Complex Λ -[Ru(phen)2phi]2+, Prieto Otoyá, T.D. | McQuaid, K.T. | Hennessy, J. | Menounou, G. | Gibney, A. | Paterson, N.G. | Cardin, D.J. | Kellett, A. | Cardin, C.J. (2024) *Angewandte Chemie*

Project Spotlight

Exploring modifications as a route to inhibit protein aggregation in therapeutic drugs involving recombinant proteins - GreenerRPP



Prof. Liz Topp, NIBRT, is working with the ongoing Doctoral Network: GreenerRPP: more sustainable platforms for high-value recombinant protein production, with **Arda Deniz Tugrul**, PhD candidate.

Secreted high-quality recombinant proteins, especially industrial enzymes and therapeutic proteins (biotherapeutics) are significant for healthcare and a sustainable bio-based economy. However, recombinant protein production is mainly carried out in high-income countries, resulting in inequality in the biotechnology sector. The EU-funded GreenerRPP project will develop the rapidly emerging issue of 'sustainability' in the European biotechnology industry by developing powerful new microbial and mammalian cell platforms that produce recombinant proteins in significantly high quantities and unparalleled quality. The project will improve yield and process design to increase the industry's effectiveness and reduce high levels of waste and reduce energy and raw material costs in countless industrial and domestic settings.

Arda's project will explore modifications as a route to inhibit aggregation in recombinant protein drugs. Protein aggregation is a major barrier for the safety, stability and efficacy of biologics and can occur at any stage of manufacture. Overcoming this barrier is therefore a key step towards creation of a sustainable platform for biopharmaceutical production.

Prof. Liz Topp
NIBRT

Project Spotlight

Peptide and Protein Engineering

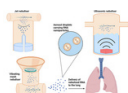


Dr Marina Rubini is a Chemical Biologist working at University College Dublin with a research focus on peptide and protein engineering to unveil biological processes at a molecular level, with the goal to both advance basic knowledge and contribute to tackle compelling societal challenges like antimicrobial resistance, health, and environment preservation.

The Rubini group combines the recombinant introduction non-natural amino acids with synthetic and semi-synthetic approaches for selectively installing modifications that endow the protein of interest with improved features. Current projects in the group include the selective fluorination of the antifungal lipopeptide iturin A, the modification of the therapeutic protein human Interferon- γ with PEG chains and defined synthetic glycans, and the engineering of industrial relevant enzymes such as ω -transaminases.

Dr Marina Rubini
University College
Dublin

Publication highlights



Nebulised delivery of RNA formulations to the lungs: From aerosol to cytosol, Neary, M.T. | Mulder, L.M. | Kowalski, P.S. | MacLoughlin, R. | Crean, A.M. | Ryan, K.B. (2024) *CrystEngComm*



Advances in Small and Large Molecule Pharmaceutics Research across Ireland

This virtual special issue of *Molecular Pharmaceutics* is dedicated to pharmaceutics research on the island of Ireland. Ireland has a strong tradition of research excellence in pharmaceutics, with a focus on developing innovative solutions for drug delivery and formulation. In Ireland, the pharmaceutical industry is a key contributor to the economy, with several major multinational companies operating in the country. Highlighting 13 articles, 8 of which feature 14 SSPC investigators and PhD researchers, across 5 Irish Universities.

An editorial written by the Guest Editors: Professors Gavin Andrews, Queen's University, **Elizabeth Topp**, Purdue University, NIBRT National Institute for Bioprocessing Research and Training & **Anne Marie Healy**, Trinity College Dublin.

NEWS UPDATE

www.sspc.ie

Commercial Spotlight

Chromwatch Process Analytics - Contactless Measurements in Real-time



Associate Prof. Emmet O'Reilly
University of Limerick

Chromwatch is a proprietary Process Analytical Technology (PAT) capable of providing “contactless” scientific measurements. It has been specifically designed for sterile environments such as biopharmaceutical manufacturing. The developed technology consists of a hardware and software combination that, when implemented as a tool for buffer management can reduce manufacturing times, increase batch throughput and optimise asset utilisation. The process is performed in a contactless format maintaining system sterility, a critical attribute for sterile environment.



[Click here for more details on application](#)



- Zero protein adherence and sensor drift
- Zero calibration time
- No sterilisation requirements
- Samples measured at site of manufacture (in-line)
- pH composition & concentration readings at point of manufacture in under 90 seconds

Real-time Analytics

- pH
- Composition
- Concentration
- Process monitoring
- Process Understanding

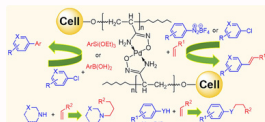
Predictive

- Control buffer dependent processes
- Remove requirement for offline analysis
- FTE Saving

Automation

- Enabling technology
- Automate key stages in downstream processing based on real-time analytics

Publication highlight



Applications of bio-resource based sustainable heterogeneous Pd-Nanocatalyst for Cross-Coupling and Michael addition reactions, Islam, M.S. | Sarkar, S.M. | Rahman, M.L. | Hasan, K. | O'Reilly, E.J. (2024) *Chemical Engineering Journal*

The SSPC Education and Public Engagement Laboratory



The first of its kind within any Irish research centre, the SSPC Education and Public Engagement (EPE) lab is a dedicated facility in enabling SSPC to provide effective and impactful EPE offerings to the Irish public. The programme associated with the lab includes a variety of activities that relate to the science underpinning SSPC research. Fundamentally, the lab is utilised to advance the science capital of visitors and participants. Science capital looks at the individual and encapsulates their scientific knowledge, attitudes, experiences and contacts. With this, we also apply an intersectional lens and work with visitors from socioeconomically deprived backgrounds. Combined, we ensure that through our pedagogically designed activities that visitors have a positive experience with STEM, a science lab and the university.

At a recent launch, at Bernal Institute, University of Limerick, SSPC convened a panel discussion on dedicated spaces for public engagement and delivered the Medicine Maker Workshop.

SSPC EPE has a global reach of >5.6M people. The programme fosters partnership, trust and empowerment with public stakeholders in (bio)pharma research.



Read more on SSPC projects in our **SSPC EPE brochure** here and discover many more impacts in the education and public engagement space here.