School of Chemical Sciences

Research Profile | November 2019



SCS Profile





Research areas

'The School of Chemical Sciences prides itself on leading research and research-informed teaching'

Bioinorganic Chemistry	Therapeutics		Pollutant
	Sensors	Imaging Agents	Measurement
Water Analysis	Nanotechnology	Chemistry Education	Computational Chemistry
Drug Delivery	Sustainable energ production	У	Polymer Chemistry

Research highlights





Research funding











THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZ

Science Foundation

2020



Infant





Advanced Manufacturing Research Centre



SCS Key Research Themes





Integration with Research Institutes





Dr. Brian Kelleher



- o Prediction of Irish Coastal Transformation due to Climate Change
- Carbon cycling in soils, sediments and water. Microbiallyfacilitated carbon dioxide sequestration in soil.





On board the Celtic Voyager







Group Field Trip:

Burren, Co. Clare







Prof. Fiona Regan



- Director, DCU Water Institute
- Water Chemistry, Materials Science inspired by nature and Environmental Monitoring



Inspiration from Nature to create materials for antifouling in the marine environment Using bio-inspired surface texturing



Dr. Blánaid White

- Investigating pharmaceuticals and personal care products in surface waters and wastewater treatment plants.
- Analysing pesticides in soils, water, food and plants.
- Evaluating metal and nutrient concentration profiles in soils, sediments, freshwaters and marine waters.





Environmental & Analytical



Featured Project:



Developing environmental quality standards for passive sampler use for metal determination in coastal waters in the Water Framework Directive





FORSTER RESEARCH GROUP

Electrochemistry, Interfacial and Materials Chemistry





Nanoscience



Sensing



Batteries



AOP Water Treatment



"Wireless" Electrostimulation of Cells



"On Demand" Drug Release







Dr. Aoife Morrin



Volatile gas signatures coming from skin relate to disease state **Headspace Solid-phase** micro extraction (HS-SPME) No direct contact with skin · Sample analysed directly with no other sample preparation steps needed Understanding electric fields in





Infant







Prof. Tia Keyes

- **Precision targeted probes for sensing** of protein, metabolites and structure and Ο (super resolution) imaging in live cells and tissues.
- Insights in metabolism, cell health, disease and therapy **biocompatable platforms for** Ο surface enhanced Raman studies of protein, cells and exosomes; and metal enhanced fluorescence.



Synthetic Biology: Cell Membrane Analogues for Drug permeation and biophysical models





Red





Imaging

Nanotechnology &









Nanomaterials Chemistry for Biomedical Applications





Dr. Mary Pryce

The Pryce group focuses on designing new and superior photocatalytic materials to target **antimicrobial resistance** and generate **renewable fuels**.

Mechanism for photocatalyzed hydrogen generation







Bimetallic photocatalyst



Photophysical model for Ru compound excitation





Dr. Kieran Nolan

- The development of new therapeutics for the treatment of multiple sclerosis (MS).
- Green synthetic technologies & the development of new energy efficient continuous flow photochemical reactors for application in chemical synthesis.

Rational Design



New Drug Lead Structure







Dr. Anthony Reilly

- Modelling the stability and properties of pharmaceutical solid forms Ο
- Development and application of new DFT approaches (e.g. PBE+MBD) Ο









Modelling THz spectra of polymorphs (TNT with and without dispersion interactions)



Dr. Andrew Kellett

Research areas:

- \circ $\,$ Inorganic and medicinal chemistry $\,$
- Metallodrug design
- Artificial gene editing
- Metallodrug-DNA interactions







Medicinal &

Inorganic

















