

# NEWSLETTER



## Welcome to the first edition of the FreeHydroCells project newsletter!

Foreword from Dr Ailbe Ó Manacháin, FreeHydroCells Project Coordinator, Lead PI, Senior Staff Scientist, University College Cork

**FreeHydroCells, designated by the EU as a “high risk / high reward” research and development project, aims to disrupt the green energy landscape.**

**At its core is developing a novel, efficient method of solar-to-chemical energy conversion to produce low-cost renewable fuel in the form of green hydrogen.**

There is a desperate need today for new and viable energy sources on Earth that are efficient, low cost, and employing sustainable materials that can function reliably for significant periods of time with minimal upkeep. Intrinsic to the efficiency is a minimal energy input to function, preferably with no energy input (excluding the energy needed for manufacturing the system of course).

In addition, new and viable energy sources must have two other important attributes: (1) the ability to provide energy as either off-grid independent systems for local energy distribution, or be connected to a grid system of some description for broader energy distribution; and (2) have a means of storing the energy until required for use, preferably in a way that conforms with environmentally friendly methods that does not require additional energy input.

Our solution is envisaged to have both the attributes of providing an energy source with storage for off-grid use locally, and for

providing different scaled energy source levels with storage for grid-connected distribution.

By converting solar energy to molecular hydrogen molecules as chemical energy, we aim for both energy conversion and energy storage.

The global environment is in serious jeopardy at this time and we must act quickly and decisively to provide solutions. Many have been working hard for years trying to solve the very problems that we are focused on, so what makes us different? The answer is, the potential of our many novel ideas and their combined implementation.

In FreeHydroCells, we explore new and novel materials individually and in combinations to control material quality, transport mechanisms, photo-responses, reduction of energy conversion loss, maximising energy exchange to the chemical environment, maintaining good operational lifetime and

### CONTENTS

Welcome	1
Meet the Team	3
What's New	16
Conferences & Events	18
Communication & Outreach Activities	20
Other Activities	21
Closing Note	21

minimising bubble adhesion with maximum photocurrent and hydrogen production.

These explorations are all carried out with the goal of a high solar-to-hydrogen efficiency at low cost and with sustainable materials in a verified system that is capable of being upscaled and commercialised at or after the completion of the project. These are big objectives, so we rely a lot on our novel ideas and their integration to get us there! If successful, this system could potentially offer society a viable, low-cost, efficient and environmentally friendly alternative to fossil fuels.

FreeHydroCells' multidisciplinary expertise is key to making this substantial science-to-technology leap. Firstly, a strong and dedicated project management activity is needed to manage and drive the project towards our stated goals and objectives. We are lucky to have an exceptional partner in UCCAC (UCC Academy) to support the coordinating body, UCC, who contributes mostly to the technical activities.

This allows more time for all the technical partners to focus on trying to achieve our technical objectives. We have expertise and a combined focus at UCC, RWTH, CNR and AMO at achieving the component level and integrated novel materials objectives, with all contributing to the characterisation objectives as well.

UCC and the SME BARDS has a focus on maximising energy transfer to the redox potential and reducing loss at the photoelectrode/electrolyte interface in order to optimise our solar-to-hydrogen efficiency levels and also to maintain stability and reliability over the lifetime of the water splitting system.

Partners UCC, CEA and AMO work together to develop and optimise the overall water splitting system that

will incorporate the hydrogen gas collection system for fuel collection and storage. There is a perfect balance among the team between fundamental academic research, science-to-technology expertise, technology test and verification, and product assessment, upscaling and commercialisation skillsets for advancing pathways to the market at or after the FreeHydroCells project.

While the ideas and concepts underpinning FreeHydroCells may have been in our researchers' minds and notebooks for much longer, project work officially began 12 months ago in November 2022.

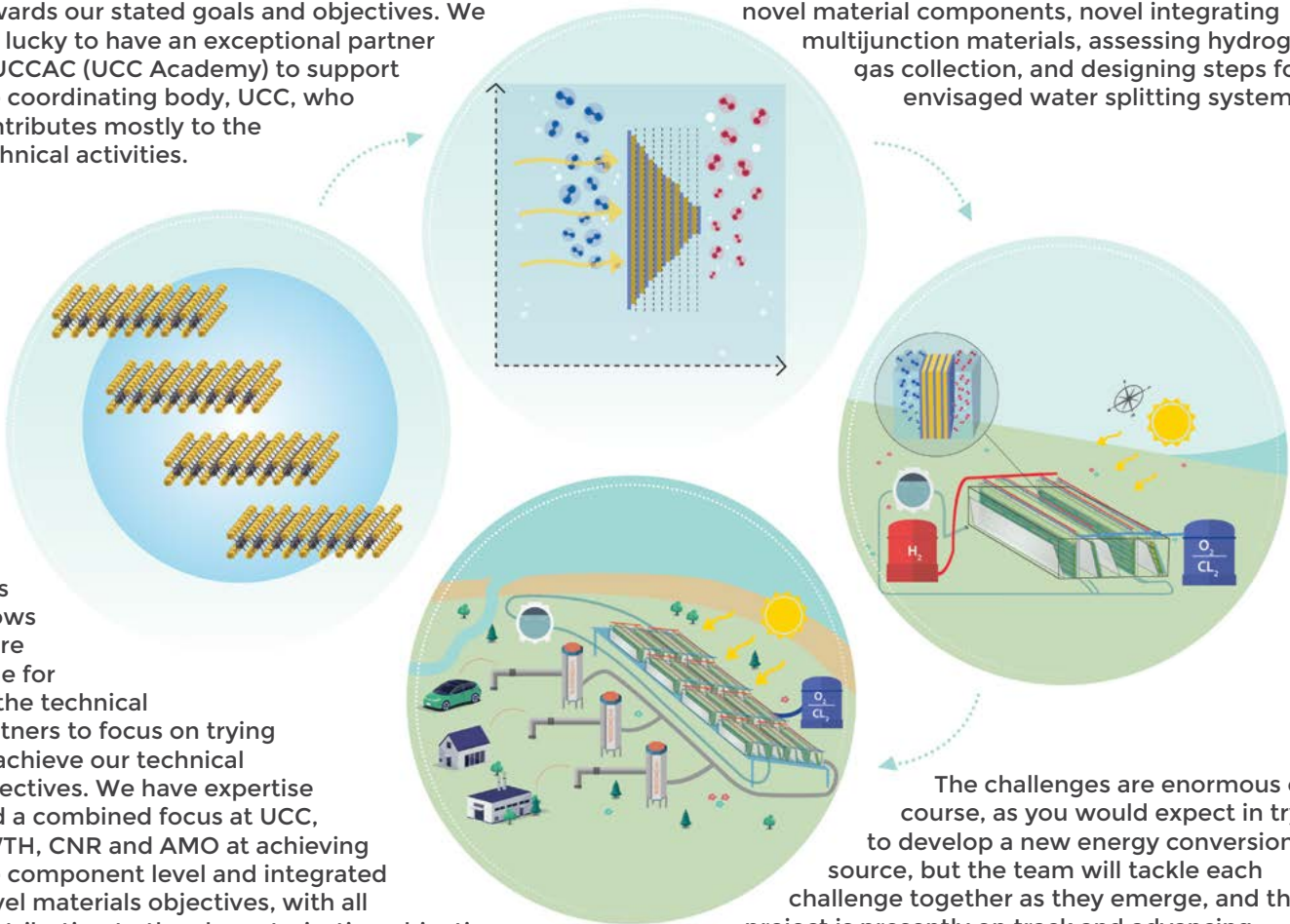
Since that time, this team of seven European partner institutions led by University College Cork has already made some progress in advancing their baseline capabilities in developing and characterising novel material components, novel integrating multijunction materials, assessing hydrogen gas collection, and designing steps for the envisaged water splitting system.

The challenges are enormous of course, as you would expect in trying to develop a new energy conversion source, but the team will tackle each challenge together as they emerge, and the project is presently on track and advancing.

This newsletter invites you to share into the past year of activity here in FreeHydroCells, and aims to give a flavour of both technical and non-technical aspects of the project. I hope you enjoy reading it.

For more information, visit our website [freehydrocells.eu](https://freehydrocells.eu), connect with us on [Twitter/X](#) and [LinkedIn](#).

You can also get in touch with our team directly via email at [freehydrocells@ucc.ie](mailto:freehydrocells@ucc.ie).





# Meet the FreeHydroCells Team

University College Cork (Ireland) leads a multi-partner European collaboration alongside partners AMO GmbH (Germany), CEA (France), CNR (Italy), RWTH Aachen University (Germany), BARDS Acoustic Science Labs (Ireland) and UCC Academy (Ireland).

Here we get to know more about the expertise of the organisations and people involved in FreeHydroCells, and the unique component each brings to the project.

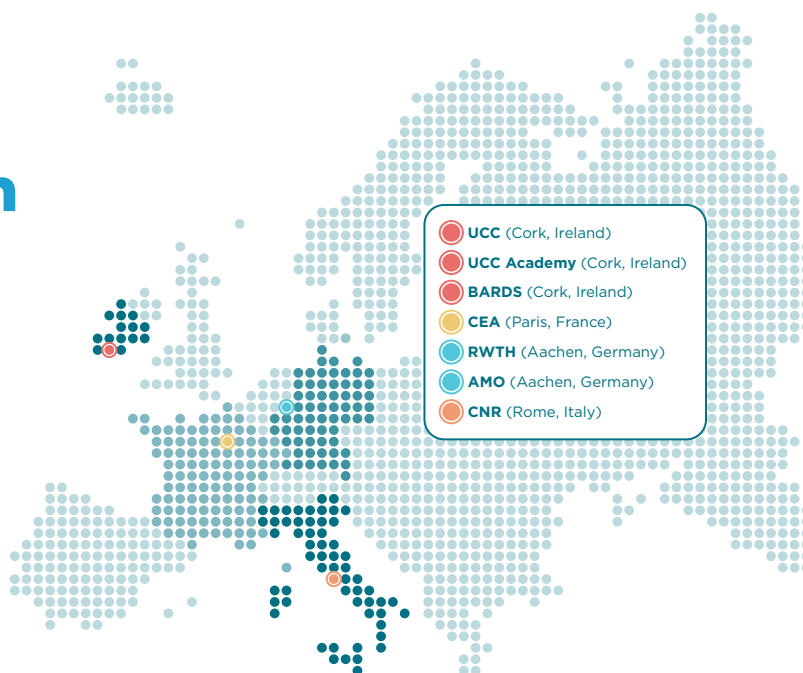


Founded in 1993 in Aachen, Germany, [AMO GmbH](#) is a research institute for nanotechnology. Its mission is to bridge the gap between fundamental science, innovation and applications.

With decades-long expertise in semiconductor technology, AMO acts as a pathfinder for new technologies in the fields of nanoelectronics, photonics, sensor technology, diagnostics, energy and environment. The company cooperates closely with RWTH Aachen University. It runs a 400m<sup>2</sup> cleanroom with over 80 employees across 30+ publicly funded research and development projects.

In FreeHydroCells, AMO is heavily involved in Work Package 1, starting with the building blocks of the proposed photoelectrochemical (PEC) cell design. These are single thin films of transparent conductive oxides (TCOs) and transition-metal dichalcogenides (TMDs). AMO also leads Work Package 2.

This focuses on the material growth of the multilayer, multijunction PEC cells, their characterisation and optimisation. AMO researchers will tap into their expertise in device engineering based on thin film/2D materials and the nanofabrication of novel photocatalytic surfaces. Working closely with partners from UCC and CNR, AMO will aim to provide the project with the know-how and infrastructure necessary to achieve the multijunction material stack for the PEC cell. AMO will support the rest of the consortium in demonstrating the cell's functionality and further project activities.



The AMO team working on FreeHydroCells includes:



**Dr. Ulrich Plachetka**  
Head of Sensor  
Technology department

Ulrich has been a project manager at AMO since 2007 and head of the Sensor Technology & Transducers group since 2014. He received his PhD from RWTH Aachen University (Germany) in 2013. In research, he has focused on optical and environmental engineering. Particularly, with an emphasis on nanostructuring, new semiconductor materials and plasmonics for solar cells, sensors, and more recently photocatalysis.

Ulrich's full profile is available on [LinkedIn](#).



**Desislava Daskalov**  
Research Associate/PhD  
Student

Desislava obtained her Bachelor's degree in Photonics from Sofia University, Bulgaria. She has a Master's degree

in Physics from the University of Stuttgart, Germany, with a scholarship from the Max Planck Institute for Solid State Research. At AMO, she is pursuing a PhD in Physics and has worked in Dr. Plachetka's Sensor Technology group since 2019. She joined FreeHydroCells as a researcher to grow and investigate the TCO/TMD materials and multijunctions. Desislava's full profile is available on [ResearchGate](#).



**Prof. Max Lemme**  
Professor, RWTH Aachen University and CEO at AMO GmbH

Prof. Lemme joined AMO in 1998. He obtained his PhD in Electrical Engineering from RWTH Aachen University in 2003, and became both Group Leader in Nanoelectronics and Manager of the clean room.

From 2008, he spent two years at Harvard University, Cambridge, USA. Here he focused exclusively on scientific research activities as a Humboldt-Fellow. In 2010 he was appointed as Visiting Professor at the KTH Royal Institute of Technology, Stockholm, Sweden. During this time he worked on several projects in the field of graphene. In 2012 he returned to Germany to accept a full professorship on Graphene-based Nanotechnology at the University of Siegen.

Since 2017, Prof. Lemme is the Managing Director of AMO and a full professor at RWTH Aachen, where heads the Chair of Electronic Devices.

His research interests include new materials like graphene, two-dimensional materials and perovskites and how to integrate them into electronic, optoelectronic and nanoelectromechanical devices. In FreeHydroCells, Prof. Lemme has separate and distinct roles in the project as Principal Investigator in AMO (Pathfinding R&D) and RWTH (Academic). His full profile and more information is available on [LinkedIn](#), his [Chair of Electronic Devices page](#), [ResearchGate](#), [Google Scholar](#) and [ORCID](#).

#### BARDS Acoustic Science Labs

**BARDS**  
*A Sound Approach to Chemical Analysis*

**BARDS Acoustic Science Labs (BASL)** was established following the development of a pioneering new acoustic spectroscopic instrument. Broadly speaking, **BARDS**, or **Broadband Acoustic Resonance Dissolution Spectroscopy**, is a technology which tracks changes in acoustic sound in solution to characterise drug dissolution, powder blend uniformity, and coating thickness on formulations. Furthermore, **BARDS** can help to determine Inter Batch Variability, Stability Testing and Counterfeit ID.

The novel technology was developed by Dr. Dara Fitzpatrick and his research team at University College Cork. Following the development of BARDS, the [Analytical Scientist](#) awarded it one of the top innovations of 2014 among the top global instrumentation companies.

BASL continues to see new applications for the BARDS technology emerging in diverse market segments. Current key target market segments include Pharma, Food and Universities, for example. BASL has seen early success with sales to global food and pharma companies, along with third level institutions. There are also increasing applications for the technology in Biopharma and Fuel Cell research sectors.

The FreeHydroCells project will use BARDS technology in the characterisation of bubble adhesion and minimisation on the photoelectrode surfaces. This is important when designing new electrode geometries with large surface areas. The technology will better ensure that the gas generated will detach from the surface.

As a result, this helps to keep the process as efficient as possible. BARDS can also detect hydrogen and oxygen at very low levels in an open system without the need for collection. In this regard, the organisation is contributing to Work Package 2, "TMD/TCO BMJ PEC cells: Application of Materials and Processing Developments for Realising BMJ PEC Cells, Optimisation and Characterisation". Furthermore, BARDS is the lead partner responsible for Deliverables 2.1 and 2.4, "Report on photoelectrochemical surface and HER and OER bubble evolution optimization performance of modified BMJ PEC cell devices".

**The BARDS Acoustic Science Labs team contributing to FreeHydroCells includes:**



**Dr. Dara Fitzpatrick**  
Director

Dara Fitzpatrick is a Lecturer in Analytical Chemistry in University College Cork, and Director of BARDS Acoustic Science Labs. He is a member of the Institute of Chemistry in Ireland and the Royal Society of Chemistry. Dara completed his PhD at Trinity College Dublin under the supervision of Professor John Corish.

His research focused on the area of transdermal drug delivery. He followed this completing a European Framework V postdoctoral fellowship in the area of transdermal drug delivery modelling.

This included training in HSE Sheffield and Amsterdam. During this time, Dara also obtained a HDip in statistics from Trinity College Dublin.

Dara has published and been cited widely in high impact international journals such as Analytical Chemistry, International Journal of Pharmaceutics, Chemosphere. He also featured on a front cover of *Analyst* journal. Dara has authored two book chapters and presented over 30 papers at international conferences. He recently presented at Oxford – Sub-standard and Falsified Medicines: [www.nature.com/articles/s41598-021-90323-2](http://www.nature.com/articles/s41598-021-90323-2).



**Christopher Kent**  
PhD student

Christopher is a PhD student at BASL, researching the characterization of hydrogen evolution using solar energy at novel electrodes using Broadband Acoustic Resonance Dissolution Spectroscopy. He holds a MSc in Analytical Chemistry from University College Cork. He completed a project assessing the BARDS ability to identify the formation of co-crystal systems.

From this project, he published a [paper](#) titled 'Tracking cocrystallization of active pharmaceutical ingredients with benzoic acid cofomer using Broadband Acoustic Resonance Dissolution Spectroscopy (BARDS)'. Christopher has leveraged his skillset to a wide array of responsibilities at BASL.

These include installation of onsite BARDS units for customers across the food and pharmaceutical industries. He has also been responsible for inventory management, instrument assembly, method development and report writing.



**Eileen O'Callaghan**  
Customer Support  
Manager and Company  
Secretary

Eileen has been working at BASL since 2016. Prior to this she was the Manager of University College Cork's Chemistry Department, which is among the largest laboratory-based academic departments in UCC. Her wide-ranging responsibilities encompassed day-to-day management of the Department. This included oversight on strategic and operational goals across teaching and research activities.

Additionally, Eileen initiated and assisted with the formulation of policies, procedures and practices for the effective functioning of the Department. She also had management responsibilities over all financial and resourcing activities. Eileen's role at BASL is Customer Support Manager, along with being the Company Secretary.

Eileen joined BASL seven years ago, just as the company was incorporated. As a result, she played a central role in putting in place all of the systems required for the effective and legal functioning of a limited company. On a day-to-day basis Eileen manages administrative and financial functions, and provides support to existing and potential customers. On FreeHydroCells, Eileen manages the BASL budget and fulfils the role of financial signatory.

**Commissariat Energie Atomique / French Alternative Energies and Atomic Energy Commission (CEA)**



**CEA** is a key player in research, development and innovation in four main areas: defense and security, low carbon energies (nuclear and renewable energies), technological research for industry, fundamental research in the physical sciences and life sciences. Achieving carbon neutrality by 2050, combating urban pollution, limiting energy dependence on critical raw materials, and gaining competitiveness are the major challenges of



low environmental impact mobility, whether on the road, at sea or in the air. These are ambitious goals to which the CEA has been making a major contribution for more than 20 years, covering the entire R&D value chain, from materials and components to integrated systems.

The CEA is involved in the design of vehicle powertrains as well as in energy production for electric mobility. It is also involved in the development of new generations of fuels that can replace fossil fuels.

In FreeHydroCells, two [CEA-Liten](#) laboratories are piloting Work Package 3 with expertise in electrochemistry, photonics, photoreactors, multiphysics and multi-scale modeling and up-scaling testing of solar installations. Starting with the design and implementation of the bath/flow photoelectrochemical (PEC) chamber subsystem with the materials developed in Work Package 2, laboratory tests of this subsystem will be performed to maximize the absorption of light, reduction of bubbles and therefore optimization of hydrogen production.

CEA-Liten is also heavily involved in Work Package 4, which focuses on gas collection with an optimized architecture and testing of fully integrated BMJ PEC cells including its gas collection system. CEA-Liten will operate its H2PAC platform in [CEA Grenoble](#) and the solar and characterization facilities of the Durasol Solar platform in CEA at [INES – Institut National de l’Energie Solaire](#).

CEA-Liten researchers will use their expertise in the development and test prototyping of a system of self-sustaining water-separating photoelectrochemical cells. In close collaboration with UCC partners, CEA-Liten will aim to provide the systems knowledge and experimental testing infrastructure needed to evaluate the optimization, scaling and the evolution of the targeted PEC system.

#### The CEA team working on FreeHydroCells includes:



**Estelle Le Baron**  
Senior Material  
Research Engineer

A Research Engineer, who graduated in 2000, Estelle’s first research activity was focused on aeronautical and aerospace materials applications. In 2017 she joined the Solar Systems and Thermodynamics Laboratory in the National Institute of Solar Energy (INES), a part of CEA-Liten. Estelle is working on the durability of materials, optical characterization tools and lifetime analysis with correlation between tests and modelling for solar

applications. In FreeHydroCells, she manages the CEA team and will study the durability of photoreactors and their optical characterization. Estelle’s full profile is available on [ResearchGate](#).



**Frédéric Vidal**  
Senior Mechanical  
Research Engineer

Frédéric is a Research Engineer working on solar thermal technologies. Having graduated in 2006, his first research activity was focused on high temperature electrolyzer technologies.

He joined the Solar Systems and Thermodynamics Laboratory in CEA-INES in 2009. His research activities focused on the design of solar thermal technologies, including 5 patents. Frédéric’s technical expertise is mainly focused on thermal, mechanical and optical aspects.

His work encompasses a wide variety of project subjects, from the development of specific test bench for characterisation of component performance, right through to design and simulation of system performance. His profile is available on [LinkedIn](#).



**Dr. Muriel Matheron**  
Research Director

Muriel graduated in 2001 from the Ecole Nationale Supérieure de Techniques Avancées, and obtained her PhD in Material Science from the Ecole Polytechnique in 2005. She is currently Research Scientist at CEA, where she conducts research on silicon / perovskite tandem solar cells fabrication and characterization.

In the past 10 years, her research has focused on the development of encapsulation systems and characterization tools to improve solar cells efficiency and stability (including organic, perovskite and silicon / perovskite photovoltaics).

She is also interested in solar fuels, obtained by coupling solar cells to electrolyzers to produce hydrogen or

carbon-based chemicals. She is co-author of over 20 papers in international scientific journals and holds 12 patents. Muriel's profile is available on [ResearchGate](#) and [LinkedIn](#).



**Nathalie Dupassieux**  
Head of Solar Systems and Thermodynamic Laboratory

Nathalie leads the Solar Systems and Thermodynamic Laboratory at CEA. She has authored (h-index = 8) more than 20 publications in international journals and developed patents in the fields of alternative fuels production and solar process dynamic management.

Nathalie graduated in Chemical Engineering from Technical University Compiègne, France in 2003. She spent 9 years with IFPEN (Institut Français du Pétrole), where she developed processes (gasification, hydrothermal, hydrodesoxygenation) to convert biomasses (lignocellulose and triglycerides) to alternative fuels.

Nathalie joined CEA-Liten's National Research Solar Institute in 2012, where she initiated the 'solar fuels' theme, focusing on the reactor design and scale-up for Syngas, Hydrogen and solar processes.



**Delphine Bourdon**  
European Collaboration Strategy Manager

Delphine is a Research Engineer, who graduated in 1999 in fluid dynamics and thermal energy. Delphine first joined CEA in 2005, conducting research on PEMFC fuel cell systems.

In 2012, she moved into the Solar Systems and Thermodynamic Laboratory, initially working on solar thermal systems, then expanding her focus to district heating systems.

Delphine currently manages CEA-Liten's participation strategy for European Research Programs. In this capacity, she will monitor results generated within the FreeHydroCells project, with a view to potential follow-up activities.



**Frédéric Fouda-Onana**  
Research Engineer expert in electrochemistry and electrocatalysis fuel cells

Frédéric is a Research Engineer on materials and testing protocols for low temperature water electrolysis (PEM and AEM). His expertise covers electrochemistry and electrocatalysis.

His profile is available on [ResearchGate](#).



**François Sauzedde**  
Designer expert in Proton Exchange Membrane Fuel Cell systems

François is a Technician at CEA Liten's Fuel Cells Stacks and Systems Laboratory where, since 2014, he has been focusing on fluid architectures and instrumentation.

More recently, François' work has expanded to hydrogen safety projects for fuel cell vehicles. His previous experience includes 4 years' working on BIPV solutions (Building Integrated Photovoltaics) with the National Institute of Solar Energy.



**Eric Pinton**  
Head of Fuel Cell Stacks and Systems Laboratory

A PhD and senior scientist in physics and energies, Eric is the Head of the Fuel Cell Stacks and Systems Laboratory at CEA-Liten.

**Institute for Microelectronics and Microsystems,  
Consiglio Nazionale delle Ricerche (IMM-CNR)**



**Consiglio Nazionale delle Ricerche (National Research Council) is the largest research council in Italy. As a public organisation, its remit is to support scientific and technological research.**

Based within CNR, the **Institute for Microelectronics and Microsystems**, with over 220 personnel, develops cutting-edge processes and technologies to create micro-nano devices and electronic and photonic sensors for applications in numerous sectors, such as energy, environment, bio-medicine, agritech, space, telecommunications, transport, neuromorphic and quantum computation. The IMM's activities range from basic research (synthesis, modelling, characterization of advanced materials and processes) to enterprise innovation (prototyping, technology transfer to companies, promotion of start-ups).

IMM operates out of six Institute sites around Italy, based in Catania (Headquarters), Agrate Brianza, Bologna, Catania (University), Lecce and Roma.

Thanks to the know-how in micro and nano-manufacturing and the infrastructures present across the Institute's sites, IMM's activities span materials science, process development, device manufacturing and systems integration.

IMM supports its research activities with funding derived from numerous national and international projects in collaboration with important research centres, companies, public institutions, and universities. In particular, IMM participates in public calls for European Grants of particular relevance, such as the ERC and Horizon Europe programs.

The Institute's activities are supported by the Italian Regions of Sicilia, Emilia Romagna, Puglia, Lombardia and Lazio. These initiatives go well beyond pure economic support. Indeed, these regional organisms have started an analytical process aimed at identifying the research demand necessary to further develop the local economic activities. Several Technological Districts have hence been established; IMM is for example a member of the Technological Districts "Micro and Nanosystems" in Sicily, "High Technology Network" in Emilia Romagna

and "Innovaal" in Puglia. The role of IMM also includes the training of Bachelor, Master, and PhD students, in collaboration with neighbouring universities. IMM is also engaged in outreach activities, with the aim of disseminating research results to school students at all levels, and to society more broadly.

The IMM-CNR group contributes to FreeHydroCells through extensive characterization activity of the materials and devices prepared by the consortium. This is done by using a combination of structural, optical, and electrical measurement techniques for the evaluation of workfunctions, band offsets, band-gap, interface states, PEC characteristics of the TMD and TCO materials and interfaces, and of the TMD/TCO junction devices prepared by the consortium. In particular, the group will perform the following characterization activities:

- Optical measurements such as reflectivity / transmissivity / external and internal quantum efficiency, Raman, and FTIR.
- Electrical measurements as DC measurements, small-signal AC techniques for the electrochemical characterization of the PEC devices such as EIS and for the characterization of semiconductor heterojunctions and dielectrics such as hi-lo frequency C-V, G/ -V conductance method, etc.
- Chemical and nanostructural characterization techniques by XPS and TEM/STEM. In particular, IMM's TEM / STEM facility has a strong focus on the characterization of semiconductor nanostructures.

In addition to characterization activities, the group plans to perform synthesis of novel TCO materials with the aim of tailoring workfunction, band gap and offsets, conductivity, etc. Several TCOs will be studied and synthesized trying to optimize the interfaces with the materials of the devices and the electro-optical coupling with the ultra-thin TMD layers embedded in TCO.

**The IMM-CNR team working on FreeHydroCells include:**



**Dr. Salvatore Lombardo**  
Research Director

Salvatore A. Lombardo received a B.S. (cum laude), as well as a PhD in Physics from the University of Catania, Italy, in 1989 and in 1994, respectively. He joined CNR in 1994, and in the period 2001-2006 he was Senior Scientist at the CNR-IMM Institute. He has held the position of



Research Director of this Institute since 2007. Salvatore has also spent various periods as visiting scientist at Cornell University, IBM-Research, and STMicroelectronics. His research interests are in the field of semiconductor devices and electronic materials. He was involved in the coordination of several national and European research & development projects, and of scientific collaborations with institutions in the USA, Singapore, and Israel. He is now responsible for the laboratory of photonics Beyond Nano facility at CNR-IMM, and is currently involved in numerous national and EU research projects. He is author of 11 US patents, 10 review articles, and of about 250 scientific and technical papers published on international journals, with about 6850 citations and H index of 37.



**Dr. Giorgia Franzò**  
Senior Researcher

Giorgia Franzò is a senior researcher at the Institute for Microelectronics and Microsystems (IMM) within Consiglio Nazionale delle Ricerche (CNR) in Catania, Italy. She received her master's degree and PhD in Physics from the University of Catania in 1992 and 1996, respectively. In 1999 she joined the National Institute for the Physics of Matter (INFM) in Catania, before moving to CNR.

Her research interests mainly focus on Si-based micro-photonics and in particular on silicon nanostructures (with and without rare-earth doping), rare-earth compounds, and Si nanowires. She is author of more than 180 papers in International scientific journals and holds 2 patents. The pioneering character and the impact of her research activity is demonstrated by the huge number of citations (more than 9500) and her h-index (42).



**Dr. Stefania M. S. Privitera**  
Senior Researcher

Dr. Stefania M. S. Privitera is a Senior Researcher at IMM-CNR in Catania. She obtained a PhD in Physics at the University of Catania, Italy in 2002. After completing a postdoctorate at IMM-CNR, in 2004 she joined STMicroelectronics as staff member in the R&D department, working on design and characterization

of electronic device. Since 2011 she has been a staff research scientist at IMM. Her expertise includes optical and electrical characterization of materials for electronic devices, with a particular focus on chalcogenide materials for electronic memories, and materials and devices for solar fuels (hydrogen and ammonia).



**Dr. Maria Miritello**  
Senior Researcher

Dr. Maria Miritello is a Senior Researcher at CNR since 2009. She obtained her PhD in 2007 from University of Catania, Italy. Her research activity is focused on the development of innovative nanostructured materials with particular emphasis on the control of synthesis techniques and on advanced structural, chemical, and optical characterization.

Her main applications fields of interest are energy, photonics, and environment. In FreeHydroCells, she develops TCO thin films and their integration in the TCO/TMD heterojunctions for the realization of the multijunction PEC cells. Maria's full profile is available on [ORCID](#), [LinkedIn](#), and the [IMM-CNR](#) website.



**Dr. Giuseppe Suriani**  
Technologist

Giuseppe Suriani received a bachelor's degree in Electronic Engineering and a master's degree in Microelectronic Engineering (cum laude) from the University of Catania, Italy, in 2005 and in 2007, respectively. He began to research in the field of Photodetectors (SPAD, SiPM) and Electronic on Plastic in collaboration with IMM-CNR and STMicroelectronics.

Giuseppe has also worked for the National Institute of Geophysics and Volcanology (INGV), carrying out scientific research on Designing and prototyping of a smart device for volcanic ash detection and monitoring. Giuseppe has good knowledge and experience in water treatment, Solar Photovoltaic field and also in Technology Transfer (TT) activities and Startup Ventures. He has been co-founder and CEO of eRALOS3, an Italian high-tech

startup. Today at CNR-IMM he is a Technologist - Project Manager and he deals with TT, innovation, projects and planning in general. In FreeHydroCells he deals with TT, dissemination and communication activities, and is a member of the project's Impact Committee.

His profile is available on [LinkedIn](#).



**Dr. Giuseppe Nicotra**  
Senior Researcher

Dr. Giuseppe Nicotra is a Senior Researcher and the Head of the Sub-Ångstrom Electron Microscope LAB at CNR-IMM.

He holds a bachelor's degree in Physics, and a PhD in Materials Science. His research primarily involves working on electron microscopy, and he has been applying Energy-filtered transmission electron microscopy (EFTEM) in studying Si nano particles since 2001.

More recently, his research has focused on the topic of growth of SiGe on Ge virtual substrate and atomic characterization of epitaxial Graphene through Cs corrected STEM. Giuseppe is also the Coordinator of the EU project ESTEEM3's Italian team, and is the author of over 60 international scientific papers.

His full profile is available on [LinkedIn](#).



**Dr. Gabriella Milazzo**  
Researcher

Gabriella holds a PhD in Materials Science from the Università degli Studi di Catania, Italy.

She has been at CNR-IMM since 2011, working on deposition and characterization of catalysts for solar fuel generation. She is currently developing new deposition techniques for 2D TMD materials.

Gabriella's full research profile can be found on her [Google Scholar](#) page.



**Dr. Roberto Corso**  
PhD Student

Roberto Corso is a PhD student at University of Catania and IMM-CNR since 2020. He obtained his Master's degree in Physics from University of Palermo in 2020.

His PhD research program is focused on the development, characterization and testing of innovative Si-based photovoltaic systems. Within the FreeHydroCells project, Roberto collaborates to the characterization and investigation of 2D transition-metal dichalcogenide films for photovoltaic and photoelectrochemical applications. You can find Roberto's research products on his [ResearchGate](#) profile.



**Dr. Vittoria Anastasi**  
PhD Student

Vittoria Anastasi was born in 1994 in Bronte (CT) Italy. In 2022 she obtained a Master's degree in Chemical Science, developing expertise in UV-Vis, IR, NMR, and mass spectroscopy.

In May 2023 she started a PhD in Material Science and Nanotechnology at the University of Catania and at CNR-IMM. Her focus is on the deposition and characterization of 2D nanomaterials for innovative photovoltaic applications within the European project FreeHydroCells. Vittoria's full profile is available on [LinkedIn](#).



**Dr. Giuseppe Tranchida**  
PhD Student

Giuseppe Tranchida was born in 1997 in Catania, Italy. He

obtained his bachelor's degree in Industrial Chemistry in 2019 and his master's degree in Chemical Sciences (Materials Chemistry and Nanotechnology curriculum) in 2021 at the University of Catania.

In November 2021 he started a PhD course in Materials Science and Nanotechnology at IMM-CNR and at the University of Catania. His research involves the synthesis and structural, morphological, electrochemical and catalytic characterization of heterogeneous nanostructured catalysts. Giuseppe's full profile is available on [LinkedIn](#).



**Dr. Salvatore La Manna**  
PhD Student

Salvatore received his Bachelor's degree in Chemistry of Materials at University of Catania in November 2019. After work experience at IMM-CNR as research fellow, he started a PhD programme in Materials Science and Nanotechnologies at the University of Catania in November 2021.

He is currently working at the Department of Physics and Astronomy, University of Catania, and at IMM-CNR labs. His main scientific interests are focused on the optimization of innovative materials for photovoltaics. In particular, his research activity involves the synthesis, engineering and characterization of Transition Metal Oxide thin films, used as selective contacts, and Transparent Conductive Oxides. More information is available on Salvatore's [research profile](#).

**RWTH Aachen University**



**RWTH Aachen University** (in German: **Rheinisch-Westfälische Technische Hochschule Aachen**), is a German public research university located in Aachen, North Rhine-Westphalia, Germany.

With more than 47,000 students enrolled in 144 study programs, it is the largest technical university in Germany. At RWTH, the [Chair of Electronic Devices](#) (ELD) focuses on investigation of electronic, optoelectronic and

nanoelectromechanical components made of graphene and related two-dimensional materials. Amongst these, integrated components are the focus of research, which is mainly experimental in nature.

Aspects of process engineering and process integration complement the activities. In addition to the proof of concept of novel components, the chair work with industry and circuit development to clarify questions of manufacturability and system compatibility of the new materials and components. The chair cooperates closely with *AMO GmbH* which carries a 400m<sup>2</sup> clean-room facility, and alongside are the research facilities provided at Central Laboratory for Micro- and Nanotechnology (ZMNT) which include access to an additional 1054 m<sup>2</sup> of clean-room.

In FreeHydroCells, ELD is one of the leading team members in Work Packages 1 and 2, starting with the building blocks of the proposed photoelectrochemical (PEC) cell design. These are single thin films of transparent conductive oxides (TCOs) and transition-metal dichalcogenides (TMDs).

The tasks in Work Packages 1 and 2 focus on the material growth (especially TMDs) of the multilayer, multijunction PEC cells, their characterization and optimization. ELD researchers will tap into their expertise in device engineering based on thin film/2D materials and the nanofabrication of novel photocatalytic surfaces. Working closely with partners from UCC and CNR, ELD will aim to provide the project with the know-how and infrastructure necessary to achieve the multijunction material stack for the PEC cell.

**The ELD team working on FreeHydroCells include:**



**Vikas Jangra**  
Research Assistant/PhD Student

Vikas received his Bachelor's degree in Physics Hons. from University of Delhi, India. He has obtained dual masters, one in Physics from University of Delhi, and the other one as Master of Technology in Solid State Materials from Indian Institute of Technology Delhi, India. Currently he is pursuing a PhD in Electrical Engineering at the Chair of Electronic Devices, at RWTH Aachen University.

Vikas has worked with Professor Max Lemme's group since 2019 on 2D materials growth and their potential applications in electronic and optoelectronic devices. Vikas' research profile can be found on his [LinkedIn](#) page.





**Dr. Satender Kataria**  
Senior Researcher

Satender is a Senior Researcher at RWTH Aachen University since 2017. He obtained his PhD in 2010 from University of Madras, India. His expertise lies in the area of thin-film technology.

His research has a particular emphasis on synthesis and advanced applications of novel two-dimensional materials and their heterostructures in the field of electronic, optoelectronic and neuromorphic devices.

#### University College Cork (UCC)



**University College Cork (UCC) is a university located in the city of Cork, County Cork, in the southern province of Munster in Ireland. An award-winning institution with a history stretching back over 170 years, today UCC is ranked in the top 1.1% of universities globally.**

UCC is a comprehensive research-focused, science-to-technology-oriented university with a diverse student body of over 24,000 including 4,000 international students from 138 countries worldwide.

The university is recognised as a world-leading research institution in many areas including food and the microbiome, sustainability and climate action, digital technologies, photonics and quantum physics. Several of Ireland’s leading research centres are embedded in UCC. These include:

- **Tyndall National Institute** (micronanosystems (devices/cells-circuits-systems, 3D integration), photonics, quantum computing and nanotechnology)
- **Environmental Research Institute** (climate action, sustainable society, circular economy, energy and marine)

- **APC Microbiome Ireland** (gastrointestinal health and functional foods)

In addition to its academic and research achievements, UCC places a strong importance on being a sustainability leader. In 2010, UCC became the first university in the world to be awarded a Green Flag from the **Foundation for Environmental Education**. UCC is consistently ranked in the top 10 most sustainable universities worldwide in the **UI GreenMetric World University Rankings**, most recently climbing to 7th place globally in 2022. The **QS World University Rankings 2023-24** rank UCC 46th in the world for the advancement of sustainability.

In 2023, UCC celebrated the launch of a new 5-year strategic vision, “**Securing Our Future**”. The strategy identifies five goals for the university, in the areas of Research & Innovation, Student Success, Global Engagement, Our Staff Our Culture, and Our Place Our Footprint. These goals are pursued in the context of UCC’s overarching mission to “create and sustain an inclusive environment and culture to enable transformative research and learning for the enrichment of society and stewardship of our planet.”

The diverse UCC team has significant multidisciplinary experience across multiple departments that are engaged in the sub-nm layer-by-layer growth of novel semiconducting materials; liquid/solid interface optimisation, and electrical, photoelectrical (photoresponse), and photoelectrochemical characterisation.

The goal of the UCC Team in the FreeHydroCells project - alongside the other partners in the project - is to create and verify materials, cells, subsystems and a final system that will split water to provide hydrogen fuel. We will focus on novel transition-metal dichalcogenide and transparent conductive oxide materials.

#### The UCC team working on FreeHydroCells include:-



**Ailbe Ó Manacháin**  
FreeHydroCells Project  
Coordinator, Senior Staff  
Scientist

Ailbe Ó Manacháin (Scott Monaghan) is a senior member of IEEE and a senior staff scientist, fellow, lecturer and a Principal Investigator at UCC. He received a first-class honours BSc degree in mathematics and physics part-time from the Open University in Ireland in 1999 while working full-time within the industrial sector. He also

received a Masters of Engineering Science degree in 2002 part-time while working full-time within the research and development industrial sector. In 2007, he received a Ph.D. degree in materials science (full-time) from UCC.

Ailbe specialises in the engineering and application of semiconducting materials such as III-V and transition-metal dichalcogenides (2D materials), as well as transparent conductive oxides, for nanoelectronics, multifunctional materials systems, 3D integration and renewable energy harvesting.

His expertise encompasses Hall-effect analysis and device/cell/system electrical, photoelectrical and photoelectrochemical characterisation.

More details about Ailbe's research are available on his [UCC Research Profile](#).



**Justin Holmes**  
Professor of  
Nanochemistry

Justin D. Holmes is Professor of Nanochemistry in the School of Chemistry and a Principal Investigator in the Environmental Research Institute at UCC. He is also Deputy Director of the Advanced Materials and Bioengineering Research (AMBER) centre, a Science Foundation Ireland funded centre that provides a partnership between leading researchers in materials science and industry.

His research focuses on developing chemical methods to synthesise and assemble nanostructured materials for environmental and energy applications. He has >400 peer-reviewed research publications in materials science and is a co-founder of the UCC spin-out company Glantreo Ltd. Justin is a Member of the Royal Irish Academy and a Fellow of the Royal Society of Chemistry.



**Ievgen Nedrygailov**  
Postdoctoral Researcher

Ievgen Nedrygailov is a Research Fellow in the School of Chemistry and the Environmental Research Institute

at UCC. His work is focused on the development of new materials and technologies for the production of environmentally friendly, affordable energy for all. This includes the production of hydrogen via photoelectrochemical water splitting, the conversion of thermal energy into electrical energy, and more.

More details about Ievgen's research can be found on his [Google Scholar](#) profile.



**Paul Hurley**  
Senior Research Scientist  
at Tyndall National  
Institute and Research  
Professor in the  
Department of Chemistry

Professor Hurley received his Ph.D. (1990) and B.Eng. (1985, 1st class honors) in Electronic Engineering at the University of Liverpool. He is the Head of the Nanoelectronic Materials and Devices Group at the Tyndall National Institute and a Research Professor in Department of Chemistry at University College Cork.

Paul leads a research team of ten PhD students, post-doctoral researchers, visiting students and Tyndall Research staff who perform basic research on high dielectric constant (high-k) thin films for applications in nanoelectronics.

The current research work covers use of high-k oxides in conjunction with III-V and 2D semiconductor materials for future energy efficient logic devices and the use of high-k films in integrated capacitors. The groups are also exploring the use of MOS systems in energy applications as well as investigating the electrical properties of emerging phase change materials. Paul received an Intel Outstanding Researcher award for his work in high-k/III-V interface defect studies in 2012.

Paul is a member of the Technical Committee of the Insulating Films on Semiconductors (INFOS) conference and the International Workshop on Dielectrics in Microelectronics (WoDiM). In addition to research activities, he is a part time lecturer in the Department of Electrical Engineering at University College Cork.

He has published over one hundred papers in the field of micro and nanoelectronics, and has given over 25 invited presentations and seminars in the high-k area from 2006 to 2014.

More details about Paul's research are available on his [ResearchGate](#) and [LinkedIn](#) profiles.



**Colm O'Dwyer**  
Professor of Chemical Energy

Colm O'Dwyer is Professor of Chemical Energy at the School of Chemistry, University College Cork and an academic member at Tyndall National Institute. He received his B.Sc. degree in applied physics and Ph.D. degree in physics from the University of Limerick, Ireland in 1999 and 2003, respectively. He conducted postdoctoral research in nanotechnology and nanolithography using magneto-optically trapped, ultracold Cs atoms beams at the University of Toulouse III Paul Sabatier, Toulouse, France where he helped to develop the Atom Pencil and innovative forms of atomic nanolithography.

This was followed by research on inorganic nanostructures for nanoelectronics and nanophotonics at Tyndall National Institute, Cork, Ireland. From 2008 to 2012, he was awarded the prestigious Science Foundation Ireland Stokes Lectureship, on nanomaterials and condensed matter and solid state physics, which he held at the University of Limerick.

Presently, he leads a research group investigating the growth and device-inspired investigations of metal oxides and semiconductors for electronics and photonics, Li-ion, Na-ion, Li-S battery materials and systems, and porous metal oxides, semiconductors and photonic crystals. A recent focus is on sustainable materials for batteries, 3D printed batteries, and operando methods for examining electrochemical behaviour in real time, marrying photonics and materials electrochemistry. Prof. O'Dwyer has authored ~300 peer-reviewed papers and >60 conference proceedings. He is an organizer of >40 international conferences and symposia on semiconductor electrochemistry, optical materials, thermoelectrics, wide band gap semiconductors, and nanoscale electronic and photonic materials.

He is actively involved in *Electrochemical Society* and currently serves as Senior Vice President of ECS, and on the ECS Board of Directors. He has previously been a member of the Interdisciplinary Science and Technology Subcommittee, and past Chair of the Electronics and Photonics Division, Symposium Planning Advisory Board, Meetings Subcommittee, Publications Subcommittee and Technical Affairs Committee at ECS. He is a Fellow of the Institute of Physics.

Colm's teaching in physical chemistry is built on a strong foundation in applied physics, materials science and

physical chemistry/chemical physics. He was recently awarded a Diploma and Certificate in Teaching and Learning in higher Education based on integrative learning and research-led teaching. Colm's full research details can be found on his [Google Scholar](#) and [ResearchGate](#) profiles.



**Ian Povey**  
Principal Researcher

Dr Ian Povey is a Principal Researcher and the Head of the Advanced Materials and Surfaces Group at the Tyndall National Institute, University College Cork. Ian was awarded a B.Sc. (1989) in Chemistry (UMIST) and a PhD for his work on Spectroscopic studies of semiconductor growth mechanisms (University of Manchester). Prior to his appointment at Tyndall in 2004, he held research positions at the Universities of Leicester, Zürich and Cambridge studying aspects of materials chemistry and spectroscopy.

Ian's research group are exploring materials solutions to a wide range of problems including next generation logic switches, energy materials (solar cells, water splitting and scavenging), medical devices, sensors, and photonics. The research is focused on the understanding of fundamental material's properties, how these maybe controlled during growth processes and their optimization for the targeted application space. More details about Ian's research are available on his [Google Scholar](#) and [ResearchGate](#) profiles.



**Jun Lin**  
Scientific Researcher

Jun Lin received her B.E. degree (first-class honors) in Electrical and Electronic Engineering from University College Cork, Ireland, and bachelor's degree from Guilin University of Electronic Technology (GUET), Guilin, China, in 2010 based on a joint program between UCC and GUET. She started her PhD in January 2011 at Tyndall National Institute, UCC.

Her research focused on the electrical characterization



of electrically active defects (including interface defects and border traps) and the passivation of these defects in high-k/III-V metal-oxide-semiconductor (MOS) capacitors. She successfully defended her thesis in December 2016.

In February 2017, she started her postdoctoral research at Tyndall National Institute, working on large area growth of two-dimensional transition metal dichalcogenides (TMDs) using chemical vapor deposition (CVD) and atomic layer deposition (ALD), and the electrical characterization of the TMD films and TMD-based electronic devices. Her work has been extended to ALD of metal oxides and TMDs for photoelectrochemical cell (PEC) applications. Jun Lin is now the lab manager of Tyndall 300 mm Applied Materials ALD system and the Tyndall Hall Measurement System equipment responsible. More details about Jun are available on her [LinkedIn](#) profile.



**Cansu Ilhan**  
PhD Student

Cansu Ilhan is a PhD student within the AMBER Research Centre that encompasses University College Cork, Trinity College Dublin, and other universities in Ireland. She is a core contributor to the team working on the FreeHydroCells project at University College Cork.

#### UCC Academy



**UCC Academy DAC is the in-house consultancy of University College Cork, based in Cork, Ireland. Established a decade ago, the organisation's purpose is to define, develop, drive and deliver key projects that further the University's strategic goals.**

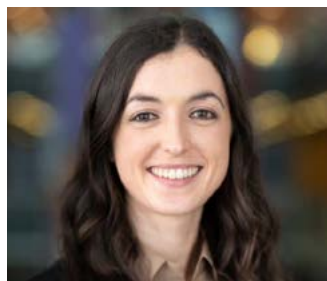
With a continuously expanding staff of currently over 50 people, the organisation is a diverse collective of highly experienced project and programme managers, internationalisation specialists and subject matter experts. The organisation is divided into four

business units, each delivering distinct expertise in the fields of Project and Programme Management, Internationalisation, Creative Services and Business Support services.

As the Project Management and Communications partner on the FreeHydroCells project, UCC Academy is the main contributor to Work Package 5, 'Project Management and Impact Activities: Project, Administration, Financial, Legal, Research, Strategic and Data Management, Communication, Dissemination, and Exploitation'. UCC Academy has significant experience in each of these areas from the management of a wide range of large-scale funded research projects, and it is uniquely positioned to deliver a customised and flexible management solution which best suits the needs of the project.

The organisation's Creative Services unit provides the project with professional expertise in communication and dissemination activities including branding, video production and graphic design support. This expertise has been key in developing the unique brand identity and 'voice' of FreeHydroCells.

#### The UCC Academy team working on FreeHydroCells includes:



**Rebecca Buckley**  
EU Project Manager

Rebecca holds a BSc in Biochemistry from UCC and a research masters in Biological Science from the University of Cambridge. She has also completed a PGDip in Digital Marketing. Rebecca has previously held marketing and project management positions in the UK with Abcam, a biotechnology company headquartered in Cambridge, and academic publisher Springer Nature in London. During these roles, Rebecca worked on a number of high-profile product launches including a portfolio of Nature-branded online scientific journals.

She also led a range of strategic projects aimed at improving marketing effectiveness within a global team of 100+ people. Rebecca joined UCC Academy in 2019 as EU Project Manager, specialising in EU-funded research projects.

She is currently Project Manager for FreeHydroCells, as well as for another UCC-led Horizon 2020 project, **TRANSLATE**. On FreeHydroCells, Rebecca fulfils crucial leadership and oversight functions, sitting on the project's

decision-making Executive Board and General Assembly, as well as chairing the Impact Committee. She is the responsible Task Leader of several Work Package 5 tasks and deliverables.

Rebecca's role is to monitor and guide the overall progression and performance of FreeHydroCells against defined metrics and targets, as well as to ensure the project adheres to key governance frameworks. Her role encompasses management of research data, intellectual property, risk and change, reporting, budget, consortium relationships, and communications. Rebecca's full profile is available on [LinkedIn](#).



**Anna Power**  
Project Officer

Anna is a graduate of Trinity College Dublin, where she received the Entrance Exhibition Award and her LLB in Law and Business. She also holds a MSc in Coastal and Marine Environments: Policy, Processes, Practice

from University of Galway, and a PGDip in International Business Development from Technological University Dublin. Anna's experience includes project and client management, particularly across the food and environmental sectors.

She has previously worked at Bord Bia North America, providing Irish client food and beverage companies with legal and technical supports for export and business development, and at GDSI Ltd, a project management consultancy based in Galway, Ireland. Prior to joining UCC Academy in January 2023, Anna was Project Manager of an EU-funded circular economy wastewater remediation project based at the Environmental Research Institute in University College Cork.

As Project Officer, Anna currently provides research support across several projects in the areas of administration, management and communications.

On FreeHydroCells, Anna's role is to support the Project Manager across day-to-day operations and activities including administration, organisation and logistics, management support, financial management, purchasing, and internal and external communications. She is also responsible for content creation and publication across the project's website, social media platforms and other outreach channels.

Anna's full profile is available on [LinkedIn](#).

## What's New?

### General Assembly meeting

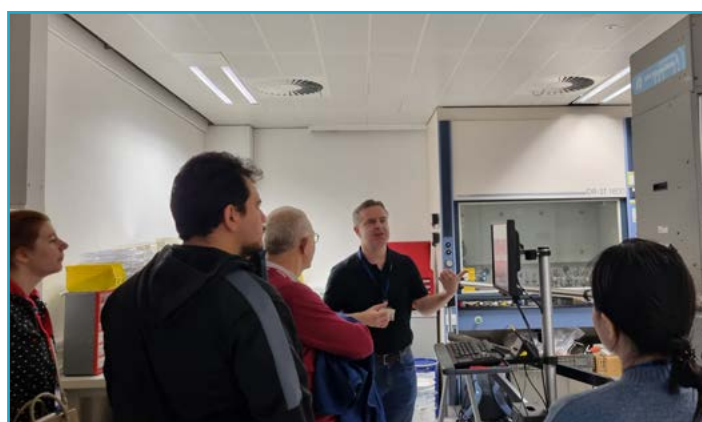
The project's first annual General Assembly meeting took place from October 4<sup>th</sup>-5<sup>th</sup> 2023 in the town of Kinsale in county Cork in Ireland. Hosted by lead partner [University College Cork](#), the purpose of the meeting was to assess work package progress to date, and to align partners and teams towards achieving project targets and deliverables due in early 2024.



Day 1 saw the meeting kickoff with progress updates from partners in Work Packages 1 and 2. These concern advances in transition-metal dichalcogenide (TMD) and transparent conductive oxide (TCO) materials, a crucial component underpinning the design of the project's core concept of a buried many junction photoelectrochemical cell.







Work Package and task leaders outlined the status of each task against agreed work plans. The main focus point for activities centered on reporting deadlines upcoming in April 2024. Leaders assessed the extent to which activities will develop over the next 6 months, in line with agreed deliverables and timeframes.

The sessions also provided an opportunity for highlighting any challenges or obstacles encountered by the team in the course of research activities. The goal is ensuring that all partners are cognisant of potential risks, and are working off the same page.

Achieving this commonality is an important basis for ultimately delivering on the project's scientific and technical commitments. The day's session also covered project management and impact activities.

After a full day of technical meetings, the group got some fresh sea air on a historic walking tour of Kinsale town. With the autumnal Irish weather cooperating – just about!

Day 2 opened with a discussion and progress update on technical Work Packages 3 and 4. Following a similar format to the previous day, all eyes were on the progress to date, and upcoming plans into 2024.

In the afternoon, the group took a tour of the lab facilities at University College Cork's *Tyndall National Institute*, as well as the *School of Chemistry's* lab facilities at the

*Environmental Research Institute*, which also hosts UCC's activities in the *AMBER Centre*.

This included demonstrating the various operational capacities at UCC's disposal which may be available to partners for their integrated activities, emphasizing the multi-departmental and multi-disciplinary capabilities of UCC. This is an important element in a "high risk/high reward" project that relies heavily on working interrelationships and cross-institutional cooperation.

Drawing to a close an eventful two days, the group donned their raingear and braved the worsening Irish weather for a walking tour of University College Cork's historic campus. Highlights included the Main Quadrangle, built in 1850, the Honan Chapel, and the Crawford Observatory.

Overall, the meeting represented a successful continuation of cooperation between partner institutions, and a catalyst for driving scientific progress over the months ahead.

As project Coordinator Dr. Ailbe Ó Manacháin remarked, the meeting was "essential in progressing such a challenging, exploratory project, as the project aim for novel science and technology impacts in the renewable solar energy field by splitting water for truly green hydrogen fuel can only be achieved by working closely as a single team."



# Conferences & Events

## NRW Sustainability Conference

Partners from AMO represented the project at the 9th NRW Sustainability Conference, which took place at the North Rhine-Westphalia state parliament in Düsseldorf, Germany.

The theme of this year's event, "Joint. Sustainable. Action", reflected our project's aim to deliver a novel, efficient, low-cost, solar-to-chemical system for the production of green hydrogen. FreeHydroCells research presence was promoted by a pullup banner and brochures at the AMO booth.



As the AMO team highlighted, "it was great to see the personal engagement of Oliver Krischer, Minister for the Environment, Nature Conservation and Transport of the State of North Rhine-Westphalia (pictured here with FreeHydroCells team member Ulrich Plachetka), and of Dr. Eckart von Hirschhausen, a Member of the NRW Sustainability Advisory Council". A full write up from the event is available on AMO's LinkedIn page [here](#).



## ISMES X Summer School

The FreeHydroCells project concept was featured among a series of potential future technologies in sustainable energy production, at the International School of Materials for Energy and Sustainability (ISMES X) in Catania, Sicily.

Project promotional brochures were distributed alongside a presentation by FreeHydroCells Team member, and ISMES X School Director, Professor Antonio Terrasi.

A full report on the training school is available on our website [here](#).





## NRW Nano Conference

The NRW Nano Conference is Germany's largest conference in the field of nanotechnology, innovative materials, and related application fields and markets.

FreeHydroCells was represented at the booth of partners AMO GmbH and RWTH Aachen, who spoke to visitors about the project's research work, and distributed promotional material.

You can read a full report of the Conference on our website [here](#).



## Partnering for Engaged Research

The FreeHydroCells project was represented at the "Partnering for Engaged Research: Environment and Climate Action" event organised by Access Europe in conjunction with University College Cork in March 2023.

The interactive networking event aimed to bring together civil society representatives and researchers who are both working in the environment and climate space, and to provide an opportunity to influence and shape research, share expertise, and cultivate an evidence base to inform research, services and advocacy work.



# Communication & Outreach Activities

## Videos



The project produced a ‘show and tell’ style video focused on atomic layer deposition (ALD) equipment being used by project researchers in the course of their work at Tyndall National Institute.

[www.youtube.com/watch?v=dkklw15moTY](http://www.youtube.com/watch?v=dkklw15moTY)

The video was a collaboration between project partners UCC, spearheaded by researcher Jun Lin who designed the concept and content, and UCC Academy, whose professional videography expertise was deployed to film, direct and produce the finished product.

We are also in the midst of producing a new video, inspired by the WIRED 5 Levels series explaining the project concept at varying levels of complexity – so watch this space!

All videos will be shared on FreeHydroCells’ YouTube channel (@FreeHydroCells).

## Nanovate Magazine feature



Entitled ‘Inspired by Nature’, a two-page feature on the FreeHydroCells project was published in the June 2023 edition of *Nanovate!* magazine.

The piece illustrates how the core concept of FreeHydroCells draws on naturally occurring photosynthesis processes found in the natural world. *Nanovate!* is a biannual industry-focused magazine offering insights into research and innovation in the nanotechnology sector.

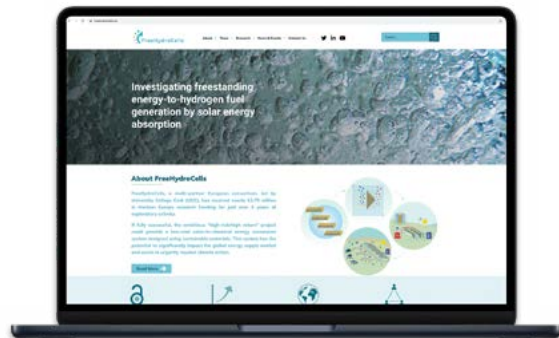
## Press Release and Media Coverage

A *press release* highlighting FreeHydroCells was released alongside the project launch in November 2022. This led to the publication of a *news feature* in the *Engineers Journal*, an industry-focused online publication.

A *news article* entitled: “New Horizon Europe project FreeHydroCells aims to investigate freestanding energy-to-hydrogen fuel generation by solar energy absorption” was published on the website of Tyndall National Institute in January 2023.

A *news article* entitled: “FreeHydroCells: In Search of a Breakthrough in Solar Hydrogen Production” was published on the website of project partner AMO GmbH in February 2023.

## Website and social media



FreeHydroCells communicates its research to the broadest possible audience through a project website ([www.freehydrocells.eu](http://www.freehydrocells.eu)).

Regular blog posts provide insights into news and activities happening on the project. Published research outputs will also be made available on the website as the project progresses.

We also maintain a regular social media presence on Twitter / X (@freehydrocells) and LinkedIn (FreeHydroCells), and encourage you to follow the project on these platforms for all of our latest updates.





## Q&A sessions



We have published two Q&A conversation style features, featuring FreeHydroCells researchers who share their unique insights into the project work:

- Q&A with the Project Coordinator, Dr. Ailbe Ó'Manacháin. [Check it out here.](#)
- Q&A with MSc student Alex Buttimer, who completed a summer internship with the FreeHydroCells project. [Read it here.](#)

## Other Activity



### Sunergy endorsement

FreeHydroCells along with lead partner [University College Cork](#), was delighted to announce its endorsement of the [SUNERGY](#) initiative in May 2023. SUNERGY is a group

of experts spanning industry, academia and society, established to advocate for solar fuels and chemicals as the new paradigm for achieving the goal of a climate neutral Europe by 2050.

It supports Research and Innovation initiatives working towards the conversion and storage of renewable energy into fossil-free fuels and chemicals. SUNERGY is one of a number of industry and academic groups which has endorsed the FreeHydroCells novel hydrogen fuel production concept from its inception phase. This latest development builds on the close collaborative relationship already established, and paves the way for future cooperation towards the shared goal of fossil-free fuels and a climate neutral Europe.

## Technical meetings



The project hosted two technical meetings in 2023, one in Catania in Sicily in June, and a virtual meeting online in March. The purpose of these meetings is to gather the entire research consortium together, and to provide a space to discuss the nitty gritty of the scientific and technical aspects of the project.

A full report on the in-person meeting is available to read [from this link.](#)



## Closing Note

**We hope you have enjoyed reading the first FreeHydroCells project newsletter!**

**If you have any feedback or would like to get in touch with the project team, we would love to hear from you at any of the contact addresses listed here.**

- Email: [freehydrocells@ucc.ie](mailto:freehydrocells@ucc.ie)
- Website: [freehydrocells.eu](http://freehydrocells.eu)
- Twitter/X: [@freehydrocells](https://twitter.com/freehydrocells)
- LinkedIn: [FreeHydroCells](https://www.linkedin.com/company/FreeHydroCells)