A World Leading SFI Research Centre

Science Foundation Ireland sfi For what's next

Advancing Materials for Impact

AMBER

AMBER European Projects

AMBER has a track record in delivering excellent science with 24 ERC awardees since 2013 and over 60M secured in international research funding.

Our researchers collaborate widely internationally through a variety of research funding programmes, from one-to-one PI collaborations to collaborative European funded programmes and beyond.

Since 2013 AMBER attracted in excess of €50 million in European and International research funding, for a variety of fundamental and applied research projects.

Our funding strategy is based on three pillars:

- Development of a pipeline of new researchers via a personalised funding strategy and career development plan for each of our promising researchers
- Contribution to the development of national and European research strategy.
- Our researchers contribute their expertise in Steering Committees and European Technology Platforms, such as ETP Nanomedicine, EFFRA, European Materials Characterisation Council, AM-Platform and Batt4EU (the European batteries partnership).

Through our International funding programme we source new opportunities and partnerships globally.

In European funding we focus on collaborative programmes in pillar 2 of Horizon Europe and beyond, as well as the ERC programme, the EIC and MSCA programmes to support the excellent science of our researchers.

From our base in Trinity College Dublin, we contribute to EU research policy developments through the LERU and Coimbra university networks

Examples of EU funding projects

H2020-MSCA-COFUND-2019

ADMIRE

Advanced Materials Research Postdoctoral Fellowship Programme

TRL 1-5

A training and development programme of scientific excellence for postdoctoral researchers that offers a unique combination of disciplines and industry engagement in Advanced Materials and Bioengineering Research www.ambercentre.ie/admire

NMBP-02-2018

SAFE N MEDTECH

Safety Testing In The Life Cycle Of Nanotechnology-Enabled Medical Technologies For Health

TRL 4–7

Will build an innovative open access platform to offer to companies and reference laboratories, the capabilities, knowhow, networks and services required for the development, testing, assessment, upscaling and market exploitation of nanotechnology-based Medical and Diagnosis Devices. cordis.europa.eu/project/rcn/221200/factsheet/en

FET FLAGSHIP

Graphene Flagship

Graphene-based disruptive technologies

TRL 1—9 across Flagship

TRL 1–3 IN AMBER

The mission of the Graphene Flagship is to take graphene and related layered materials from a state of raw potential to a point where they can revolutionise multiple industries. graphene-flagship.eu

H2020-NMP-2014

DRIVE

Diabetes Reversing Implants with enhanced Viability and long-term Efficacy

TRL 5–6

Develops technologies to improve pancreatic islet transplant therapy for diabetes mellitus.
drive-project.eu

H2020-FETOPEN-1-2016-2017

Transpire Terahertz

RAdio communication using high ANistropy SPIn torque Resonators

TRL 3–4

Developing a new class of magnetic materials, enabling new and exciting terahertz (1000 gigahertz) technologies, which could underpin the next wave of the Big Data revolution. transpire.eu

H2020-NMBP-PILOTS-2017

Sun Pilot

Piloting of Innovative Subwavelength Nanostructure Technology for Optical ans Injection Moulding Applications

TRL 6–7

Developing a novel and cost-effective platform for up-scaling the fabrication of sub-wavelength nanostructures across large and non-planar surfaces.
sunpilot.eu

H2020-FETOPEN-2018-2019-2020-01

RADICAL

Fundamental Breakthrough in Detection of Atmospheric Free Radicals

TRL 1-3

Developing a simple, low-cost method to detect important atmospheric radicals, improving the monitoring of air quality and leading to better predictions of climate change. https://radical-air.eu/

H2020-BBI-JTI-2016 Flagship

AgriChemWhey

An Integrated Biorefinery For the Conversion of Dairy Side Streams to High Value Bio-Based Chemicals

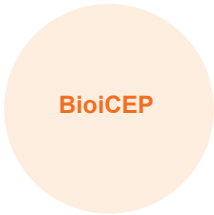
TRL 7–9

Seeks to build a first-of-a kind, industrial-scale bio-refinery which will take by-products from the dairy processing industry and convert them into cost competitive, sustainable lactic acid. agrichemwhey.com

European Commission | Horizon 2020 European Union funding for Research & Innovation
SEVENTH FRAMEWORK PROGRAMME
eit RawMaterials Connecting matters
BIO-BASED INDUSTRIES Public-Private Partnership

H2020-NMBP-BIO-CN-2019

BioiCEP



Bio Innovation of a Circular Economy for Plastics

TRL 5-6

Developing a sustainable route to a circular economy for plastics by developing an advanced energy, carbon, and cost-efficient waste plastic biotransformation into high market demand bioproducts and bioplastics.
www.bioicep.eu

H2020-WIDESPREAD-2020-5

EngSurf-Twin

Reinforcing the Scientific Excellence of Selcuk University in Engineered Surfaces and Films for Emerging Technologies

TRL 5–6

Boosting innovation capacity in engineered surfaces and films for emerging technologies
https://engsurf-twin.eu

H2020-FETOPEN-2018-2019-2020-01

NANOLACE

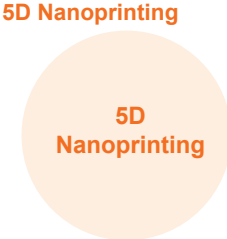
Nanolace Mask Based Lithography for Fast, Large Scale Pattern Generation with Nanometer Resolution

TRL 1–3

Laying the foundations for fast, large-scale pattern generation at the atomic scale for future industrial applications
https://www.nanolace.eu/

H2020-FETOPEN-2018-2019-2020-01

5D Nanoprinting



Functional & Dynamic 3D Nano-MicroDevices by Direct Multi-Photon Lithography

TRL 1–3

Developing innovative smart/functional material with tailorable properties for faster prototyping and design of micro-electromechanical systems (MEMS)
https://5dnanoprinting.eu/

H2020-MSCA-RISE-2020

DEMANS

Design and manufacture of sustainable materials for additive manufacturing technologies

TRL 1-3

Design and additive manufacture of parts, components and devices using sustainable (bio)polymer materials.
https://cordis.europa.eu/project/id/101007584

European Commission | Horizon 2020 European Union funding for Research & Innovation
SEVENTH FRAMEWORK PROGRAMME
eit RawMaterials Connecting matters
BIO-BASED INDUSTRIES Public-Private Partnership

Examples of ERC projects

ERC Advanced Grant Awardees:

Fergal O'Brien — ReCaP

Regeneration of Articular Cartilage using Advanced Biomaterials and Printing Technology
Aims to revolutionise the treatment of damaged articular joints by combining cutting edge advances in the area of 3D printing & advanced manufacturing with stem cell/gene therapy.

Jonathan Coleman — FUTURE-PRINT

Tuneable 2D Nanosheet Networks for Printed Electronics
Novel methods to use liquid exfoliation to develop printable electronics and sensors using 2D materials.

Jonathan Coleman — INTEGRATE

Personalised Medicine for Intervertebral Disc Regeneration-Integrating Profiling, Predictive Modelling and Gene Activated Biomaterials
Combining gene-based therapy and biomaterials to develop a new way to treat lower back pain

ERC Consolidator Grant Awardees:

Valeria Nicolosi — 3D2DPrint

3D Printing of Novel 2D Nanomaterials: Adding Advanced 2D Functionalities to Revolutionary Tailored 3D Manufacturing Ireland's only six-time ERC recipient, whose work examines the processing and characterising of nanomaterials for the development of novel energy storage devices

Danny Kelly — JointPrinting

3D Printing of Cell Laden Biomimetic Materials and Biomolecules for Joint Regeneration
3D bio-printing for whole joint regeneration, which could treat injuries and diseases such as osteoarthritis, without complex surgery.

Wolfgang Schmitt — Supramol

Towards Artificial Enzymes: Bio-inspired Oxidations in Photoactive Metal-Organic Frameworks
Tackles global energy needs by developing new sustainable fuel-producing systems using light and highly porous materials classified as metal-organic frameworks (MOFs).

ERC Starting Grant Awardees:

Larisa Florea

ChemLife

Artificial micro-vehicles with life-like behaviour
Develops bio-inspired microscopic vehicles fabricated from stimuli-responsive materials using advanced 3D fabrication technologies, which hold potential as autonomous drug delivery systems within the human body.

Michael Scanlon

SOFT-PHOTOCONVERSION

Solar Energy Conversion without Solid State Architectures: Pushing the Boundaries of Photoconversion Efficiencies at Self-healing Photosensitiser Functionalised Soft Interfaces
Develops "soft" novel materials self-assembled at liquid-liquid interfaces capable of achieving solar energy conversion without solid electrodes.

Alessandro Lunghi

AI-DEMON

Artificial intelligence design of molecular nano-magnets and molecular qubits.
Artificial intelligence design of molecular nano-magnets and molecular qubits.
Machine-learning computational methods will be the used to design new materials, in particular, new magnetic molecules for applications in quantum technology.

Aidan McDonald

HurdlingOxoWall

Late First-Row Transition Metal-Oxo Complexes for C–H Bond Activation
Takes a Nature-inspired approach to design and prepare powerful oxidation catalysts, a potentially sustainable, cheap, and green route to these high-commodity chemicals.

AMBER researchers have won a total of 24 ERC awards to date, a clear indication of the scientific excellence of the Centre. These awards provide fundamental new insights into a range of research challenges, spanning the domains of medical devices, battery technologies, energy conversion, 2D materials and green technologies.

AMBER European Projects

AMBER has extensive expertise and experience in developing successful EU funding applications. We are currently seeking partners for the following calls.

Materials for Energy applications and batteries

AMBER investigates off-grid applications including innovative energy capture/recovery materials and new battery/supercapacitor technologies based on novel 2D and other emerging materials. We are also developing inorganic analogues of photosynthesis processes where light energy can be converted into fuels.

- HORIZON-CL5-2021-D3-01-16: Cost reduction of CO2 capture (new or improved technologies)
- HORIZON-CL4-2021-RESILIENCE-01-14: Development of more energy efficient electrically heated catalytic reactors (IA)
- HORIZON-CL4-2021-RESILIENCE-01-17: Advanced materials for hydrogen storage (RIA)
- HORIZON-CL5-2021-D2-01-02: Advanced high-performance Generation 3b (high capacity / high voltage) Li-ion batteries supporting electro mobility and other applications (Batteries Partnership)
- HORIZON-CL5-2021-D2-01-03: Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries supporting electro mobility and other applications (Batteries Partnership)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-18: 2D materials-based devices and systems for energy storage and/or harvesting (RIA)
- HORIZON-CL5-2021-D2-01-04: Environmentally sustainable processing techniques applied to large scale electrode and cell component manufacturing for Li ion batteries (Batteries Partnership)
- HORIZON-CL5-2021-D2-01-05: Manufacturing technology development for solid-state batteries (SSB, Generations 4a - 4b batteries) (Batteries Partnership)
- HORIZON-CL5-2021-D3-02-02: Next generation of renewable energy technologies

Materials for ICT

Research here focuses on providing disruptive advances in science across new devices, magnetic functionality and novel materials for plasmonic systems. The work centres on developing understanding and fabrication strategies to drive the genesis of beyond state-of-the-art devices including the monolithic, integration of devices into back-end-of-line circuitry and low power magnetic devices and spintronics.

- HORIZON-CL4-2021-DIGITAL-EMERGING-01-14: Advanced spintronics: Unleashing spin in the next generation ICs (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-10: Innovative materials for advanced (nano)electronic components and systems (RIA)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-17: New generation of advanced electronic and photonic 2D materials-based devices, systems and sensors (RIA)
- HORIZON-CL4-2021-DIGITAL-EMERGING-01-06: Advanced optical communication components (IA)
- HORIZON-CL4-2021-DIGITAL-EMERGING-01-07: Advanced Photonic Integrated Circuits (RIA)

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Engineered Functional Materials

AMBER researches the use of new material synthesis and disruptive fabrication techniques (including additive manufacture) to create ground-breaking systems and devices. These range from fabricating molecularly distinguishing membranes through to 3D printed electronic devices. It encompasses concepts such as rational molecular design through self-assembly and device fabrication.

- HORIZON-CL4-2021-DIGITAL-EMERGING-01-27: Development of technologies/devices for bio-intelligent manufacturing (RIA)
- HORIZON-CL4-2022-TWIN-TRANSITION-01-02: Products with complex functional surfaces (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations - membrane distillation (IA)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-20: 2D-material-based composites, coatings and foams (IA)
- HORIZON-CL4-2022-TWIN-TRANSITION-01-15: New electrochemical conversion routes for the production of chemicals and materials in process industries (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-12: Functional multi-material components and structures (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-19: Advanced materials modelling and characterisation (RIA)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-03: Advanced multi-sensing systems (RIA)
- HORIZON-CL4-2021-DIGITAL-EMERGING-01-31: Functional electronics for green and circular economy (RIA)

Materials for Health

Research in AMBER explores applications in regenerative medicine combining innovative scaffold systems with therapeutics to address important problems. The work spans 3D printing of next-generation scaffolds for orthopaedic repair to advanced systems for nanomedicine delivery and novel electroconductive systems to address infarcted heart muscle and restore functionality to damaged nerves. Our world leading research has resulted in 9 ERC investigator awards to date under the AMBER health theme.

- HORIZON-HLTH-2021-DISEASE-04-07: Personalised medicine and infectious diseases: understanding the individual host response to viruses (e.g. SARS-CoV-2
- HORIZON-HLTH-2021-TOOL-06-02: Next generation advanced therapies to treat highly prevalent and high burden diseases with unmet medical needs
- HORIZON-CL4-2021-RESILIENCE-01-20: Antimicrobial, Antiviral, and Antifungal Nanocoatings (RIA)
- HORIZON-HLTH-2022-TOOL-12-01-two-stage: Computational models for new patient stratification strategies
- HORIZON-CL4-2022-RESILIENCE-01-13: Smart and multifunctional biomaterials for health innovations (RIA)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-35: Advanced characterisation methodologies to assess and predict the health and environmental risks of nanomaterials (RIA)
- HORIZON-CL4-2022-DIGITAL-EMERGING-01-19: 2D materials-based devices and systems for biomedical applications (RIA)

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European Union
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