UNIVERSITY OF CAMBRIDGE

HENRY ROYCE INSTITUTE

ROYCE

OPEN ACCESS FACILITIES FOR RESEARCH & INNOVATION

The University of Cambridge is a Founding Partner of the Henry Royce Institute for advanced materials research and innovation.

Royce is the UK's national institute for advanced materials research and innovation, funded by the Engineering & Physical Sciences Research Council (EPSRC), a part of UK Research & Innovation (UKRI).

Royce provides a network of open access deposition, fabrication and characterisation facilities at the University of Cambridge. Our aim is to drive the development of energy-efficient materials. All equipment is available for use by researchers from academia and industry, both locally and nationally. Seed funding is often available.

The University of Cambridge is one of four Partners in the Royce Atoms to Devices Research Area; focussing on activities that underpin the development of novel devices of the future, and supporting the engineering of new technologies that can translate into applications. This includes photonics, imaging, semiconductors and sensors to energy storage, biomedical materials and quantum technologies. Located at the West Cambridge site across departments and run from the Maxwell Centre.

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royce@maxwell.cam.ac.uk

Royce Cambridge

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FACILITIES

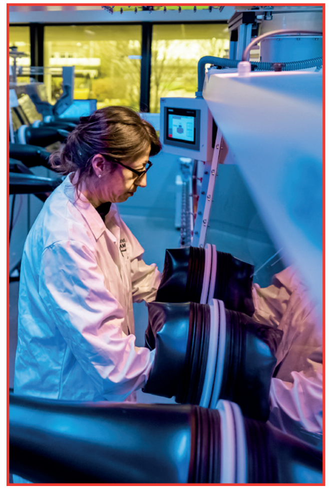
Royce Cambridge supports research and innovation through a network of 18 open access deposition, fabrication and characterisation facilities.

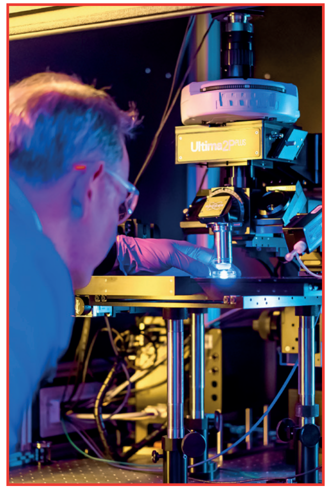
Large Facilities

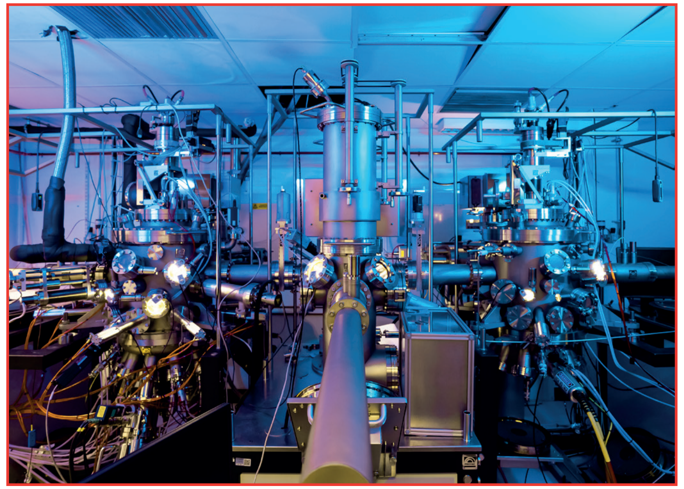
- Physical Vapour Deposition and Characterisation Facility
- Battery Development Facility
- 3D Bioelectronics Facility
- Electron Microscopy Facility
- Ambient Processing Cluster Facility

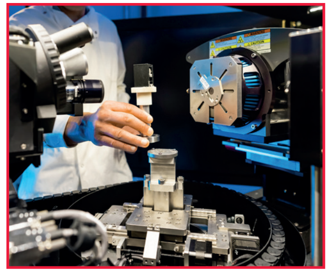
Fabrication and Deposition

- Electron Beam Lithography
- Molecular Beam Epitaxy (MBE)
- Sputter Deposition
- UV Mask Aligned Lithography



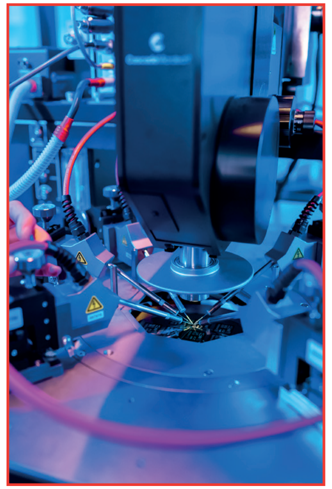


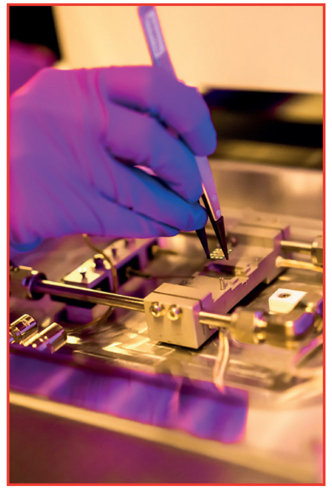




Characterisation

- X-Ray Photoemission Spectroscopy (XPS)
- 3D X-Ray Computed Tomography (XRCT)
- Electrical Characterisation Suite
- Wafer-Scale Atomic Force Microscopy (AFM)
- Nanoscale Quantum Sensing and Imaging
- High Frequency Antenna Measurement
- Magnetic Property Measurement System
- Wide Bore Magnet
- Thermoelectric Testing





CASE STUDIES

NOVEL DEVICE FABRICATION TECHNIQUES

Generating, capturing, transporting and detecting individual photons with high fidelity and low loss is extremely challenging. Existing techniques, for example, for deterministically generating photons, can be very inefficient, limited by the probabilistic nature of the process.

This project assisted with the production and characterisation of novel quantum-photonic micro-structures that can potentially provide improvements in the efficiency of light capture and of the quality of emitted light.

Royce Support

Collaboration with Royce gave Nu Quantum access to novel equipment for device fabrication and unique expertise in materials engineering. Access to state-of-the-art facilities accelerated the research progress, gave increased confidence in commercial viability and potentially will reduce time-to-market.

"We've been delighted with the project with Royce; access to their state-of-the-art facilities and know-how have accelerated our progress with quantum-photonic"

Dr Carmen Palacios-Berraquero
CEO,
Nu Quantum

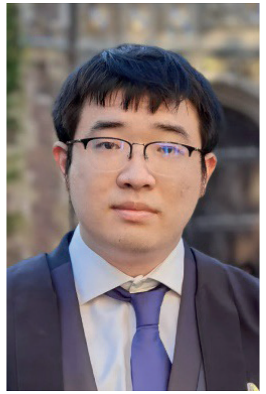
REVOLUTIONISING DYNAMIC OPTICAL CONTROL

In the rapidly evolving field of optical engineering, the integration of metasurfaces with dynamic control elements remains a pivotal challenge.

Access to the Royce Electron Beam Lithography System enabled researchers from the University of Cambridge to fabricate a liquid-crystal Huygens metasurface, leading to an unprecedented level of phase modulation in these structures. This technology promises significant advances in the biomedical sector.

Royce Support

Royce provided access to state-of-the-art equipment, funding, and invaluable expertise. Jonathan Griffiths, the Electron-Beam Lithography Facility Manager, played a crucial role in the project. They expertly handled the entire lithography process, from spin coating of resist materials to the precise EBL patterning and subsequent development.



"The system's high precision and capability to achieve less than 8 nm feature size enabled us to fabricate the complex patterns essential for our liquid crystal tunable Huygens metasurface."

Wenhan Zhang
PhD Student,
University of Cambridge

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