HENRY ROYCE INSTITUTE

UNIVERSITY OF LEEDS

the BRAGG centre
FOR MATERIALS RESEARCH

MULTI-CHAMBER DEPOSITION SYSTEM

ROYCE

The Royce Deposition System is a multi-chamber, multi-technique thin film deposition tool based at the University of Leeds as part of the Henry Royce Institute.

The system includes a preparation chamber and four deposition chambers linked together via UHV transfer systems, allowing for a range of different materials and growth techniques to be combined.

Understanding the properties of interfaces between different types of materials holds the key to desgining novel electronic and computing devices. The Royce Deposition System is the only one of its kind in the world, with five interconnected chambers under UHV for preparation and thin film growth allowing for growth of different classes of materials, deposited by a range of techniques.

ORGANICS CHAMBER

This system has been purpose built for the deposition of a wide range of molecular and organic materials such as fullerenes, metallo-fullerenes, pthalocyanines and quinolines. Combined with an e-beam evaporator, this enables the growth of hybrid metal-organic devices with multiple organic components.

- Four low temperature effusion cells for precisely controlled evaporation of organic molecules
- Four pocket e-beam evaporation system for growth of metals
- DC/RF magnetron sputtering gun for growth of metals and metal-oxides
- Substrate temperature range from -100° to 1200°C

TOPOLOGICAL MATERIALS MBE CHAMBER

This chamber is for the epitaxial growth of thin film topological insulators and topological superconductors. The system allows a wide range of alloys with precise stoichiometry aided by two high-temperature cracker cells.

- Four dual-filament effusion cells for deposition of materials such as bismuth selenide
- Low temperature effusion cell for deposition of low melting point metals such as indium
- Two valved-corrosive-metal-cracker-cells for precise stoichiometric control over materials such as antimony and tellurium
- In-situ RHEED to monitor epitaxial growth
- Substrate temperature range -100° to 1200°C

PULSED LASER DEPOSITION CHAMBER

This chamber is designed for the growth of complex oxides, including dielectrics such as STO, ferroelectrics and multi-ferroics.

- Multi-target system for growth of complex multi-layers
- KrF, 248 nm pulsed laser
- In-situ RHEED to monitor epitaxial growth
- Sample temperature range from room temperature to 1000°C

SPUTTERING CHAMBER

This system is dedicated to the development of complex multi-layer structures for research into fundamental magnetism and skyrmions, and growth of magnetic oxides such as YIG for development of spin-pumping devices.

- Eight DC/RF-magnetron sputter sources providing a wide range of magnetic and non-magnetic metals
- Off-axis sputter source for low-energy deposition onto sensitive materials
- Sample temperature range from -100° to 1200°C

The Bragg Centre for Materials Research

The Bragg Centre for Materials Research is home to state-of-the-art Royce equipment championing interdisciplinary research to enable the discovery, creation, characterisation and exploitation of materials engineered at the atomic level.

Our researchers bring together the fundamental understanding, design, modelling and fabrication of materials with their exploitation in new devices, systems, and applications to solve challenges across physical sciences, engineering and life sciences.

We work with researchers in higher education, research institutes and industry to deliver ambitious research, innovative products, devices and applications. We also provide world-leading experimental and analytical facilities to understand and build materials from the atomic to the macro-scale.

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