

HENRY
ROYCE
INSTITUTE

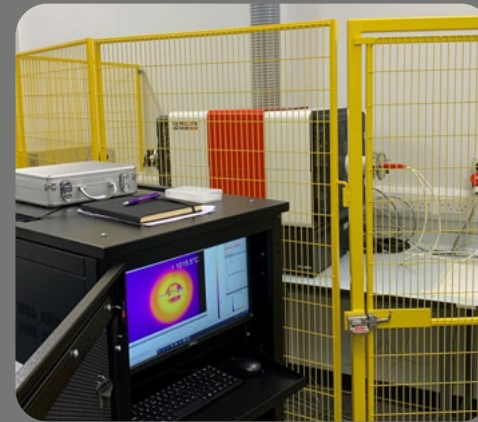
MANCHESTER
1824
The University of Manchester

FUELS & IRRADIATED
MATERIALS ANALYSIS
PLATFORM

ROYCE

The Fuels and Irradiated Materials Analysis Platform houses academic laboratory space and state of the art active equipment for manufacture, characterisation, testing and post-irradiation characterisation of α , β and γ active nuclear materials to support current nuclear power generation, and advanced nuclear and nuclear fusion materials research. This mainly supports the Royce Nuclear Materials Research Area, alongside Materials for Extreme and Demanding Environments and Imaging and characterisation.

Nuclear fuel technology facilities are housed in the Nuclear Fuel Centre of Excellence (NFCE) and the Royce Hub Building at the University of Manchester, and include experimental capabilities to synthesise, fabricate and characterise representative fuel materials. Irradiated materials facilities are housed in the Royce Hub Building at the University of Manchester, and include experimental capabilities to investigate irradiated materials high temperature nuclear systems and materials degradation in these environments.



ELECTRON MICROSCOPY

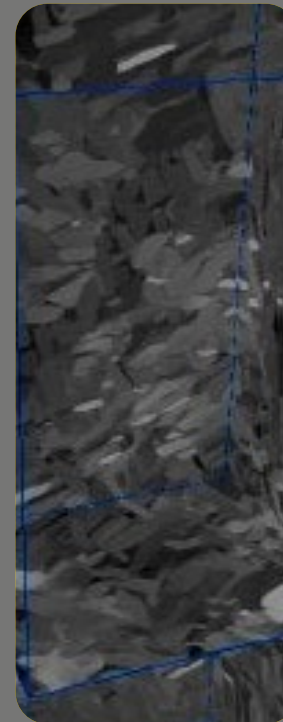
- NovaNano Scanning Electron Microscopy (SEM)
- Helios G5 Focused Ion Beam (FIB)/SEM
- Talos 200i Scanning Transmission Electron Microscope (S/TEM)

MANUFACTURE

- Arc Melter (Inert Atmosphere Glovebox)
- Vacuum/Inert Atmosphere Graphite Furnace (2200°C)
- Spark Plasma Sintering Furnace (Glovebox Coupled, 2700°C)
- H₂/N₂/Ar Tube Furnace (1800°C)
- H₂/N₂/Ar Tube Furnace (Inter Atmosphere Glovebox, 1400°C)
- Flash Sintering Furnace (1600°C)
- Mixer/Ball/Rotary Milling
- Chemical Vapour Deposition Furnace
- Hot Isostatic Press (2000°C, 300 MPa)

CHARACTERISATION & TESTING

- Thermogravimetric Analysis (1600°C)
- Differential Scanning Calorimetry (1600°C)
- Dilatometry (1200°C)
- Laser Flash Analysis (1200°C)
- Dynamic Mechanical Analysis (600°C)
- Laser Confocal Microscopy
- Raman Microscopy
- Atomic Force Microscopy
- X-Ray Diffraction Crystallography
- X-Ray Computer Tomography
- Metallographic Sample Preparation (Inert Atmosphere Glovebox)
- He-Pycnometry
- Particle Size Analysis – Laser Diffraction
- Surface Area Analysis – BET



HIGH TEMPERATURE TESTING

- 2 x 1000°C thermal treatment rigs with online Mass Spec analysis of evolved gases and 3H/14C analysis
- Instron load frame and 30 KN load cell coupled to a 2000°C Creep furnace rig complete with gas analysis and 3D micro DIC
- High (3000°C) sintering furnace
- Beta high pressure (200 bar) high temperature (360°C) Autoclave, 1.6 l vessel Physical characterisation
- PoreMaster 60GT pore volume measurement
- Porometer 3G pore size distribution
- Resonance frequency and damping analyser
- Olympus panametric Ultrasonic testing
- Pheonix TE66 dynamic mechanical analyser
- Micromeritic Tristar II surface area analyser

RADIOMETRIC CHARACTERISATION

- Packard Tri-Carb 3100TR
- Canberra NAIS-2x2
- Canberra HPGe detector
- Autoradiography

ACTIVE SAMPLE PREP

- Water Jet Cutter
- TEM Mill And Associated Ancillaries
- Spark Erosion Machine
- Optical Microscopes
- Twin Jet Electropolishers For TEM Sample Prep



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