

Overview

In collaboration with key Industrial/Governmental Stakeholders and through international contacts, skills will be maintained and developed through research and training.

Objectives

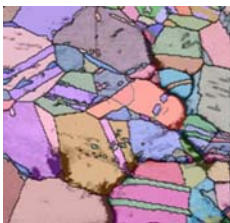
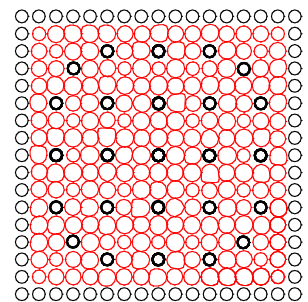
- Make research contributions to nuclear power to improve cost, safety and acceptability
- Maintain the expertise necessary for the UK to remain an informed customer
- Develop tools that contribute towards a whole system approach to nuclear power generation

Increasing the safety, reliability and sustainability of nuclear power is the challenge addressed by this new four-year initiative. The £6.1 million programme will examine issues such as how nuclear reactor systems function, how reactors are monitored and how the issue of reactor waste should be approached. The programme will also begin to address the acute shortage of people with the science and engineering background necessary to pursue a career related to the generation of electricity from nuclear reactors. Funded through the Towards a Sustainable Energy Economy Programme of Research Councils UK, it represents the single largest commitment to fission reactor research for more than thirty years.

Themes – Work Packages

W/P1. Fuel, thermal hydraulics and reactor systems

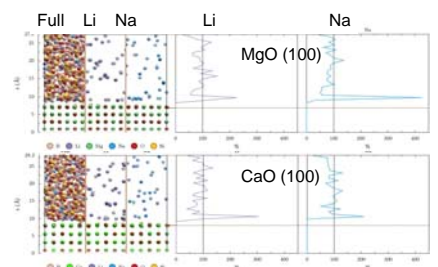
Coupling of multi-pin structural mechanics and three-dimensional transient two phase thermal hydraulic analysis for the study of severe accidents (e.g. pin ballooning under reflood conditions); crud deposition and its thermal hydraulic and neutronic effects; application of advanced CFD to Generation IV systems.



EBSD image of SCC in stainless steel

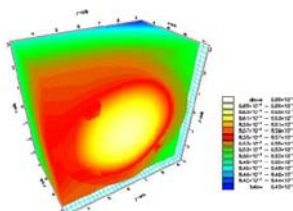
W/P 2. Materials performance and monitoring reactor conditions

Remote structural interrogation and monitoring tools; miniaturised, encapsulated monitoring systems; FE/self consistent models to assess materials; mechanical understanding and predictive models of SCC; mechanical performance of nuclear cladding and structural materials; behaviour of graphite



W/P 3. An integrated approach to waste immobilization and management

Re-mobilisation, transport, solid-liquid separation, and immobilisation of particulate wastes; develop predictive models for particle behaviour based on atomic scale, thermodynamic and process scale simulations; develop fundamental understanding of selective adsorption of nuclides onto filter systems and their immobilisation; mechanisms of nuclide leaching and transport.



6.0 cm sphere embedded in 6.2cm cuboid (quad mesh)

W/P 4. Safety and performance for a new generation of reactor designs

3D plant fault/severe accident transient studies that match UK industry plans for Generation IV (VHTR, GFR and SFR); assess demands on candidate materials under transient and normal operating conditions; scope safety approaches for the hydrogen production process and systems.