

PhD studentship at the University of Bristol (School of Physics)

Damage Tolerance in Nuclear-grade Graphite Composites under Extreme Conditions

Nuclear grade graphite has been one of the key life limiting factors for current UK Advanced Gas Cooled Reactors (AGRs) and is being projected for use in many Gen-IV reactor designs, such as pebble bed and prismatic high temperature reactors (HTRs). However, there is still a lack of understanding in the failure criteria of this class of materials under extreme conditions, for example, high temperature and post neutron radiation. In this project, you will study the damage tolerance of a range of novel grades of nuclear graphite and contribute to the selection of graphite that will be adopted for future fission reactors, internationally.

You will use X-ray/neutron diffraction, X-ray computed tomography, Raman spectroscopy and micro-mechanical testing to acquire novel insight in the stress-strain behaviour, residual stress evolution and defect development in nuclear graphite with neutron irradiation. Ultimately you will develop a microstructure-based, multiple length-scale failure criteria during your PhD. Excellent communication skills are essential for this PhD as it involves close interaction with international partners, such as University of California Berkeley, US Idaho National Laboratory, UK Nuclear National Laboratory (NNL), UKAEA Culham Centre for Fusion Energy and EDF Energy.

The knowledge gained in your PhD project will also be shared with colleagues at US FermiLab and UK Rutherford Appleton Laboratory via RaDIATE international collaboration (Radiation Damage In Accelerator Target Environments; <https://radiate.fnal.gov/>) to assist the understanding of the degradation in their fine-grained graphite target used in proton accelerator particle sources to enable fundamental particle physics experiments.

You should have a first or upper second-class (or equivalent) undergraduate degree in Materials, Physics, Chemistry or Engineering and the enthusiasm to work with international partners. This studentship is funded for 3.5 years and is based at the University of Bristol (School of Physics). It is available for UK/EU home students; however options also exists for exceptional international students.

Enquiries regarding the positions and applications including cover letter, CV and preferably transcript, should be send to Dr. Dong Liu at Dong.Liu@bristol.ac.uk. If you are interested in further research activities in Dr. Liu's group see <http://www.bris.ac.uk/physics/people/dong-liu/index.html>. Deadline for the applications is 31 January 2019. Anticipated start date for the PhD is late September, 2019.