Investigation of materials degradation in nuclear plants

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Materials in civil nuclear power plants operate at high temperatures and under high stresses over lifespans that extend for many decades. A number of UK’s current nuclear plants have been in service for more than 40 years and are going to expire in the next 5-10 years. To maximise the lives of the plants and to ensure those safe operation we need to accurately predict the high temperature degradation of materials under complex loading conditions.

In this project, the student will get a first-hand experience of how the degradations in nuclear plant materials are measured in simulated laboratory conditions. The student will manufacture samples from nuclear materials and conduct high-temperature mechanical tests at the recently built Bangor university’s high-temperature mechanical testing lab. The student will also investigate the surface of the material using scanning electron microscope to investigate the role of microstructures on the material's failure. Finally, the understanding from the experimental work will be interpreted using materials modelling tools.

Overall, the students will get a good understanding of various material deformation mechanisms of nuclear materials and an excellent experience of working in an engineering scientist role.