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POSITION DESCRIPTION

Research Associate

Position Level	Level A
Faculty/Division	Engineering
Position Number	00092670
Original document creation	28/04/2021

Position Summary

The position is part of a collaborative research project between UNSW Sydney and [Tokamak Energy Ltd](#) (UK). It will be based at the School of Mechanical and Manufacturing Engineering, which is one of the largest and most prestigious in Australia, with 2500 student enrolments, 80 academic staff, 25 professional staff, and total annual budget of over \$22 million including external research grants. The school is ranked first in Australia for Mechanical, Aerospace, and Manufacturing Engineering (QS Ranking). For further information about the School, please visit <http://www.engineering.unsw.edu.au/mechanical-engineering/>.

Tokamak Energy's work focusses on developing compact spherical tokamaks to generate fusion reactions and, ultimately, produce a plentiful supply of clean, safe, secure and affordable energy. With their team of world-class fusion scientists and magnet engineers, they are well into their mission to build a pilot plant to prove the possibility of fusion – a machine that will produce more energy than is needed to power the fusion process (otherwise known as exceeding fusion energy breakeven). This technology will form the basis of the commercial module that we intend will deliver electricity into the grid.

The appointment is an academic research role to provide insight into the radiation-induced degradation of advanced shielding materials exposed to a fusion reactor environment. Specifically, the candidate will perform atomic scale simulations of tungsten borides and other advanced ceramics to identify the type and concentration of defects that are generated from radiation damage and the evolution of these defects with increasing radiation fluence. The research aims to predict the dominant radiation effects on the material's properties, e.g. due to swelling, phase segregation, and embrittlement. The findings will advance the fundamental understanding of radiation-matter interaction in solids and inform Tokamak Energy's design and lifecycle management of the shielding components of their next spherical tokamak reactor prototype.

The role will offer opportunities to publish high-quality research and industrially relevant outcomes to the benefit of the global nuclear engineering community. The findings are expected to be published in relevant journals such as Acta Materialia, the Journal of Nuclear Materials and Nuclear Fusion.

We are a diverse, vibrant, and inclusive group, and the candidate is expected to work closely with all other team members, which include Honours students, PhD students, Research Assistants, Postdoctoral Research Associates and academic staff. People from all backgrounds are encouraged to apply.

The role also offers the opportunity to contribute to postgraduate education in Nuclear Engineering at UNSW, guide and work with Masters' and PhD students in the nuclear engineering research group at UNSW, and the opportunity to establish collaborative links with the Australian Nuclear Science and Technology Organisation (ANSTO), Imperial College London and Tokamak Energy.

The role of position reports to the Dr Patrick Burr, and has nil direct reports.

Accountabilities

Specific responsibilities for the role include:

- Conduct research in the area of radiation shielding materials independently and as part of a team.
- Perform atomic-scale simulations (DFT and classical) of point defects in selected ceramic and intermetallic materials.
- Develop mesoscale models (e.g. Object Kinetic Monte Carlo) to describe the evolution of radiation-induced point defects in selected ceramic and intermetallic materials.
- Contribute to the writing of scientific papers and reports for international journals and progress reporting to other researchers and industry partners.
- Assist with the coordination of research activities and actively contribute to research outputs to meet project milestones.
- Contribute to the preparation of research proposal submissions to funding bodies and actively seek collaboration with industry partners as appropriate.
- Engage in the wider research and scholarly activities of the research group, School and Faculty.
- Participate in and/or present at conferences and/or workshops relevant to the project as required.
- Assist with the supervision and mentorship of research students in the research area where required.
- Perform limited administrative and management work associated with the group program of research.
- Align with and actively demonstrate the [UNSW Values in Action: Our Behaviours](#) and the [UNSW Code of Conduct](#).
- Cooperate with all health and safety policies and procedures of the university and take all reasonable care to ensure that your actions or omissions do not impact on the health and safety of yourself or others.

Skills and Experience

- PhD in Materials Science/Engineering or in condensed matter physics, awarded in the last 5 years (excluding or to be awarded within the year of commencement. (Applicants without PhD level may also be considered, based on other relevant or equivalent research experience).
- Knowledge in the area of nuclear materials or radiation-matter interaction would be preferable.

- Experience in performing atomic-scale calculations using DFT packages (e.g. VASP, CASTEP, CRYSTAL), and/or classical potential/force-field packages (e.g. LAMMPS, GULP, DL-Poly).
- Coding skills in a scientific programming language and/or unix operating systems (R, python, bash).
- Demonstrated ability to conduct independent research with limited supervision.
- Demonstrated track record of publications and conference presentations relative to opportunity.
- Demonstrated understanding of operational requirements for a successful research project and managing resources.
- Knowledge and application of the principles underpinning successful grant writing.
- Experience of working with team members and PhD/Masters students to help build their research skill and knowledge and to support and guide their professional development.
- Exceptional interpersonal skills with demonstrated ability to communicate and interact with a diverse range of stakeholders and students.
- An understanding of and commitment to UNSW's aims, objectives and values in action, together with relevant policies and guidelines.
- Ability and capacity to implement required UNSW health and safety policies and procedures.

PRE EMPLOYMENT CHECKS REQUIRED FOR THIS POSITION

Verification of qualifications

About this document

This Position Description outlines the objectives, desired outcomes, key responsibilities, accountabilities, required skills, experience and desired behaviours required to successfully perform the role.

This template is not intended to limit the scope or accountabilities of the position. Characteristics of the position may be altered in accordance with the changing requirements of the role.