EPSRC & SFI Centre for Doctoral Training in Advanced Metallic Systems

PhD in Magnesium Alloys Strengthened by LPSO Phase for Forging Applications.

Supervisors: Prof Joe Robson and Prof Joao Quinta da Fonseca
Collaborators: Luxfer MEL Technologies
Based at: The University of Manchester
Stipend: Current UKRI stipend plus a top-up of £2,500p.a. in year 1 and £3,500p.a. in years 2-4, for UK and eligible EU students.
Open to: Candidates with a strong degree in a STEM discipline.

The CDT in Advanced Metallics is a partnership between the Universities of Sheffield and Manchester and the I-Form Advanced Manufacturing Centre, Dublin. CDT students undertake the CDT training programme at all three locations throughout the 4-year programme.

Magnesium is the lightest structural metal but requires strengthening for many industrial applications. A new type of magnesium alloy based on a high volume fraction of long-period stacking ordered (LPSO) phases has recently been developed that offer an exceptional combination of high strength and ductility. Luxfer MEL technologies, based in Manchester UK, are the world leaders in the development of new magnesium alloys. They have an interest in LPSO alloys for demanding, high value-added products with exceptional property requirements. However, since this class of alloy is very new, little is understood about how to best optimize the composition and processing for manufacturing of components, especially through the use of forging.

This project will use advanced thermomechanical simulation, laboratory scale forging facilities, and electron microscopy to process and characterize LPSO containing magnesium alloys to understand the interaction between alloy composition, processing, microstructure, and performance. The experimental work will be carried out using the state-of-the-art electron microscopy facilities at the University of Manchester and the new metal processing facilities within the national Royce institute for advanced materials (www.royce.ac.uk). The experimental outcomes will also be used to develop computer simulations of the forging of LPSO magnesium in collaboration with the modelling team at Manchester.

The project will involve working closely with the industrial partner, with opportunities for placements at Luxfer MEL, international travel, and presentation at scientific conferences. The project is part of a large UK programme on light alloys (LightFORM) – you will be joining the largest UK group of researchers working on light alloys and will work in a vibrant team environment with lots of opportunity to interact with your peers, collaborate with other Universities and interact with industry.

Regular progress meetings will be held with staff from Magnesium Elektron (ME) both to help guide the project and for ME to take the developments and incorporate within existing programmes. Opportunities will be available for short placements at Magnesium Elektron, utilising your skills to aid as well as helping integrate your research into industrial programmes, assisting with future direction and development of Magnesium Elektron’s capability.

Candidates are sought with a good degree in Materials Science, Engineering, Physics, Chemistry or a related subject. For more information please contact Prof Joe Robson (joseph.robson@manchester.ac.uk).