Interfacial reactions and properties in Fe-Ti-O and Fe-Al-O systems

PhD

**Funding:** 3.5 years for UK/EU students

**Supervisors:** Dr Zushu Li (WMG), Professor Sridhar Seetharaman (WMG), Gert Abbel (Tata Steel Europe)

**Supporting partner:** Tata Steel Europe

**Start Date:** ASAP

**Project overview**

An exciting opportunity to work as part of our Advanced Steel Research Centre at WMG, University of Warwick, an internationally leading centre for steel research. The ASRC is located in the new Advanced Manufacturing and Materials building and has benefited from a multi-million pound investment in new equipment.

The steels processing group consists of five academic staff, over ten research fellows, and more than twenty PhD students working in steel processing, characterisation and applications. You will join a rapidly expanding group with opportunities for collaborative as well as individual research, and benefit from new facilities and a supportive environment. The ASRC has strong links with industry, with many projects being sponsored and opportunities exit for placements within industry.

Clogging is the unwanted accumulation of solid mass on the internal surface of a flow system during steel casting leading to disturbed steel fluid flow and in a worst case to a complete blockage of the flow system. This has adverse effect on both steel production and steel quality.

Over the last decades, reports/papers on clogging have been published illustrating the severity and the complexity of the problem. However, the clogging and associated problems have not been solved completely despite progress in knowledge and implemented process improvements. The effect of refractory composition and steel composition needs further systematic study.

This project aims to study the interfacial reactions and properties in Fe-Ti-O and Fe-Al-O systems. This intends to advance fundamental understanding of clogging through the investigation of the reactions taking place on the steel-refractory and steel-inclusion interfaces. The interfacial reactions and wetting behaviours of metal droplets on tailored ceramic substrates will be assessed under a controlled atmosphere. The cluster behaviour of inclusions for the systems studied will be directly observed under confocal laser scanning microscope (CLSM). The bonding at different interfaces will be investigated by using advanced characterisation techniques such as SEM/TEM.

The project provides an outstanding opportunity to be involved in cutting-edge research of next generation sustainable steel manufacturing, and gives valuable exposure to a major area of industry - Tata Steel Europe by working closely with industrial sponsor. This project is fully sponsored by Tata Steel Europe.

**Entry Requirements**

Candidates should have a minimum of an upper second (2.1) honours degree (or equivalent) in Materials Sciences (including Metallurgy, Ceramics), Chemical Engineering, Chemistry, Geology or related disciplines. A good command of English is essential for the position.
Funding
Funding is available for UK/EU students. A stipend of £14,296 will be paid per annum for 3.5 years. An industrial top up of £3,000 will also be provided, per annum.

To apply
For informal inquiries about the project, please contact Dr. Zushu Li by email at in the first instance.

To apply please complete our online enquiry form and upload your CV.