Reduction of iron oxide by carbon and gas in a novel low carbon, low energy alternative ironmaking process
PhD

Funding: 4 years for UK/EU students
Supervisor: Dr Zushu Li (WMG) and Mr Koen Meijer (Tata Steel)
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 ASRC consists of five academic staff, over fifteen 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.

The steel industry is facing significant challenges in achieving and sustaining competitiveness, such as strict environment regulations, new energy sources, global overcapacity, and competition from other materials. In particular, for the European steel industry, the EU target of the 80-95% reduction in CO2 emissions by 2050 compared to 1990 level for European industry is far beyond the reach of the steel sector. To create an industry that will be sustainable for the future, extraction of metals needs to be lean in energy, low in C footprint and flexible with regards to raw material/energy sources.

A novel low carbon, low energy alternative ironmaking process is under active development. The understanding of the reduction reactions of iron oxide (FeO) in this promising technology is essential for its scale-up in terms of design and operation. This project aims to advance the reaction mechanisms of iron oxide (FeO) with carbon and gas in the alternative iron making process, and enable the realisation of the potential to substantially reduce its carbon footprint. This will be achieved by using specifically designed modern experimental techniques to study the reactions in the gas-slag-metal systems at high temperatures, carrying out thermodynamic & kinetic simulations for the systems studied, and characterising the samples and product gases generated with the aid of advanced characterisation facilities in the ASRC.

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

Entry Requirements
A minimum of an upper second honours degree (or equivalent) in Materials Sciences (including Metallurgy, Ceramics), Chemical Engineering, Chemistry, Geology or related disciplines. A good command of English and communication skills (verbal & written).
**Funding**
Funding is available for UK/EU students. A stipend will be paid per annum for 4 years, with an industrial top up of £3,000 totalling £17,553.

**Eligibility**
To be eligible for this project the successful applicant should have indefinite leave to remain in the UK and have been ordinarily resident here for 3 years prior to the project start-date, apart from occasional or temporary absences. Additional details of these criteria are available on the EPSRC website.

**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.