Nano-precipitation evolution during industrial coiling and annealing operations
PhD

**Funding:** EPSRC iCase Award with industrial top-up for UK/EU students for 4 years

**Supervisor:** Dr Vit Janik, Professor Sridhar Seetharaman, and Dr Zushi Li

**Start date:** ASAP

**Project Overview:**
This is an exciting opportunity to undertake a project supported by Tata Steel R&D, involving active collaboration with researchers both at Tata Steel and WMG, University of Warwick.

The experimental material to be studied is a novel automotive Advanced High Strength Steel, aiming to provide an unmatched combination of very high strength and excellent ductility, targeting applications in light-weighting of the next generation of automotive chassis components. The studied chemistries will include three low carbon V-bearing microalloyed steels supplied by Tata Steel R&D.

The project is focused on the exploitation of nano-precipitation during annealing. Work will be dedicated to studying recovery, recrystallization, and precipitate evolution by means of advanced in-situ materials characterization methods. This will include Confocal Laser Scanning Microscopy, and Heated Stage Electron Backscattered Diffraction (HS-EBSD). Small-scale interrupted tests including dilatometry and Gleeble testing in combination with Transmission Electron Microscopy will be utilized to analyse the precipitation state. EBSD will be used to study recovery and assess recrystallisation as a function of annealing settings parameters (e.g. heating rate and annealing temperature) and chemistry.

The experimental work will be accompanied by the development of a model, capturing the quantitative description of the evolution of recovery, recrystallisation, and precipitation (nucleation and growth/coarsening) during the industrial annealing cycle.

The experimental work and modelling effort in the project should ultimately provide guidelines on alloy design and annealing conditions to achieve optimised precipitation strengthening during annealing of a fully recrystallised substrate.

**Detailed scope of work:**
- Experimental studies capturing the interaction between recovery, recrystallisation and precipitation during annealing under varying heating rates and final annealing temperatures
- Recommendations on alloy and process for optimised precipitation hardening of an annealed and partially or fully recrystallised microstructure
- Model capturing recovery, recrystallisation, and precipitation during annealing
- Publications in scientific journals and conference proceedings
- Monthly reporting and interaction with researchers at WMG and Tata

The successful applicant will be based in the [Advanced Steels Research Centre](https://www.wmg.oxford.ac.uk), at WMG, University of Warwick

**Funding:**
This position provides a tax free stipend for UK/EU nationals of £14,000 (plus £3,000 industrial top-up) per year, and all fees paid are paid for UK/EU nationals, for up to 4 years.
Eligibility:
Applicants should have or expect a first class honours or good upper second class degree (or an equivalent) in Metallurgy, Materials Engineering and/or Mechanical Engineering.

Experience with Materials Characterisation methods such as Optical or Electron Microscopy and Electron Back Scattered Diffraction is a plus.

Application:
Informal enquires can be addressed to Dr Vit Janik in the first instance.

This is a COMPETITIVE application process and a formal application must be completed. Please ensure you meet the minimum requirements before filling in the online form. The information supplied will then be sent for review to assess your suitability and interviews will be conducted.

As part of the application, please supply your CV, grades and qualifications (achieved and/or expected), and a project plan and/or personal statement on why you think you should be considered for this position. Written references do not need to be supplied but may be sought after shortlisting with your permission. The awardee will however be required to supply satisfactory references at the acceptance stage.

To make an application, please complete our online enquiry form.