PhD Studentship in hot corrosion of nickel superalloys for aero-engine applications

**Department/Faculty:** Department of Materials, Faculty of Engineering  
**Campus:** South Kensington  
**Duration:** 42 months, starting October 2019

**Supervisors:** Dr Stella Pedrazzini (Imperial), Professor Mary Ryan (Imperial), Professor David Rugg (Rolls-Royce plc)

Applications are invited for a 3.5 year PhD studentship for the study of hot corrosion of single crystal superalloys for aero-engine applications, available at Imperial College London, in collaboration with Rolls-Royce plc, starting in October 2019.

Your project will help understand the fundamental effect of refractory elements on nickel superalloy corrosion. Nickel superalloys are used in the turbine blades and discs of aero-engines because of their outstanding mechanical properties up to elevated temperatures. Rolls-Royce plc, as a world leading aero-engine manufacturer, has a strong interest in understanding the failure mechanisms of alloys in service, in order to improve them. Some nickel-based superalloys fail substantially faster than others when exposed to sulphur-containing compounds, however, the mechanisms are not well understood. Refractory elements such as Mo, W, Re and Ru can accelerate the rate of corrosion when the alloy is exposed to corrosive gases and molten salts. A systematic study producing alloys with varying compositions that swap refractories (Mo/W) with elements that form protective oxides (Cr/Al) is required to understand the effect of those elements. Your project will involve the production of new alloys, advanced characterisation techniques such as scanning/transmission electron microscopy, atom probe tomography and synchrotron-based techniques. It will involve mechanical testing under different environments and some thermodynamic modelling to understand the failure mechanisms.

Applicants should have a Master’s degree in Physics, Chemistry or Materials Science and a strong interest in alloy design and characterisation. This project is well suited to a self-motivated student. You should also have excellent communication skills including proven ability to write in English.

We encourage informal enquiries about the project, which can be made to Dr. Stella Pedrazzini at s.pedrazzini@imperial.ac.uk. Further information can be found at https://www.imperial.ac.uk/people/s.pedrazzini.

This PhD studentship is funded by Rolls-Royce plc and is open to UK home/EU students. The studentship will cover tuition fees plus the standard maintenance stipend of £16,553 per annum and an additional industrial top-up of £3,500 per year from Rolls-Royce plc.

**Closing date:** 31 December 2018

**How to apply:**
The prospectus, entry requirements and application form (under ‘how to apply’) are available at: http://www.imperial.ac.uk/pgprospectus.

Applicants should send a CV and covering letter to Dr. Stella Pedrazzini at s.pedrazzini@imperial.ac.uk and will be required to complete an electronic application form. It is expected that the studentship will begin by 1 October 2019.

Committed to equality and valuing diversity, we are also an Athena SWAN Silver Award winner, a Stonewall Diversity Champion, a Disability Confident Employer and are working in partnership with GIRES to promote respect for trans people.

The College is a proud signatory to the San-Francisco Declaration on Research Assessment (DORA), which means that in hiring and promotion decisions, we evaluate applicants on the quality of their work, not the journal impact factor where it is published. For more information, see https://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-evaluation/