

Internship and Doctoral position

Description of the position

The position consists of a 6-month training plus 4-year PhD work.

Partners

- OCAS – ArcelorMittal Global R&D Gent, Department of Surfaces
- Vrije Universiteit Brussel, Electrochemical and Surface Engineering group, Department of Materials and Chemistry - Prof. Herman Terryn
- Ghent University, Department of Applied Physics - Prof. Toon Van Alboom

The training will mainly take place at OCAS, including the preliminary experimental work and data analysis and the preparation of the grant application. The PhD development will take place between the departments of the three research partners.

Research topic: Relation between the electrochemical behaviour and the phase distribution in the rust of steels upon corrosion

The nature and properties of rust formed on steel after environmental exposure is of great importance to design specific applications of different steel grades. The rust layer can provide corrosion protection that can make a steel structure last longer. The protective properties of such layer are inherent to its structure and chemical composition and phase distribution. The growth and development of the different phases is dependent on the steel composition as well as the environmental conditions.

This project aims at gaining insights into the protective characteristics of the rust by a multidisciplinary approach. Experimentally, the corrosion performance of steels is studied by accelerated corrosion tests or environmental exposure. Yet, an in-depth investigation of the anticorrosion properties of the protecting layer requires an electrochemical study to monitor the development of the layer.

The type of oxide/hydroxide compounds in the rust is undoubtedly linked to the degree of protection of the rust layer. Multiple analytical techniques will be used to characterize the rust structural properties, i.e., X-ray diffraction (XRD), Raman spectroscopy and particularly Mössbauer spectroscopy, as well as the chemical composition, i.e., electron probe microanalyzer (EPMA), etc.

The approach of this project consists in relating the electrochemical information with the phase distribution of the rust steels exposed to corrosive atmospheres.

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