**Oxidation behaviours of a Fe-based stainless steel under humid air**

Oxidation phenomenon should be considered for life estimation of components made by metals and alloys. The understanding of oxidation kinetics and atomic diffusion mechanism of oxide scale growth is very important to choose materials and manufacture process, to limit high temperature corrosion and to keep the structure integrity.

Many studies have been carried out for Fe-based stainless steel oxidation under dry air. The obtained information was very interesting to identify theoretically oxide scale growth mechanism and the associated kinetics. Few research works have been reported until now for oxidation behaviour of Fe-based stainless steel under humid air. But humidity exists in all circumstance during all stages of oxidation in reality and in most of applications, such as powder generation centre (nuclear and thermal), industrial incinerators, urban heating and hot water supply system, Solid oxide fuel cells (SOFCs) components etc…

Oxidation behaviour of Fe-based stainless steel under humid air will be studied experimentally to collect information concerning oxide scale growth kinetics with the used of multi-scale approach and multi-techniques:

* Thermogravimetric analysis (TGA) will be used to record the oxidation kinetics under humid air at high temperature (from 600°C to 900°C) with different duration (4h to 48h);
* Microstructure observation will be realized by SEM-FEG and the chemical composition of oxide scales will be studied by EDX analysis under SEM-FEG;
* Oxide phases will be identified by XRD technique;
* Residual stress, oxide growth stress and thermal stress will be analysed either by experimentation (XRD or in-situ deflexion study) or by analytical evaluation on oxide layers;

No grant from Université Paris-Sud has been provided for the internship. The student will be integrated in a PhD project.

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