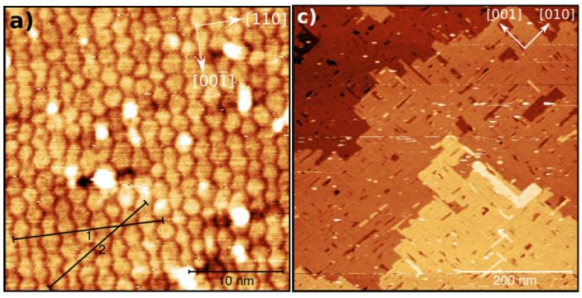
18-month post-doctoral position in Paris

Steel and nanoscience? Surface oxidation of FeAl alloys

The development of new high strength and lighter steel grades for car or aircraft industries requires the intensive use of high concentration of alloying elements such as aluminium. During recrystallization annealing and despite reducing atmosphere, these elements are prone to segregation and surface oxidation, two problems that hamper the efficiency of the galvanization process against corrosion.

A detailed analysis of alloyed steel and of their environment being out of grasp, the present post-doctoral work will develop a fundamental understanding of the surface oxidation of model single-crystal Fe-Al alloys with a given composition (15% at. Al) as an alternative to actual aluminium alloyed steel. Through a surface science approach combining ultra-high vacuum environment and high-pressure annealing, the candidate will focus on the role of the first steps of segregation and oxidation with oxygen, water vapour and both. Coupled with on-going atomistic simulations in the group, it is foreseen to understand the growth of ultra-thin oxide layers as function of various low-index orientation and thermodynamic conditions. The Graal would be to see if these layers can be described through a common short-range local environment and to describe the kinetics of oxidation.



STM images of the Al rich reconstruction of $Fe_{0.85}Al_{0.15}$(110) surface and of the ultra-thin oxide film at $Fe_{0.85}Al_{0.15}$(100)

This position of 18 months starting from October 2018 is in the framework of a project supported by the French agency for research (ANR) in close collaboration with the most upstreaming research centre of the Arcelor-Mittal industrial group (Maizières-les-Metz). The candidate will perform her/his research in the group "Low-Dimensional oxides" of INSP, the leading laboratory in nanoscience of Sorbonne University. She/he will have access to all the vacuum facilities of the group (STM, AFM, XPS, UPS, LEED, RHEED, TPD, SDRS).

The candidate should hold a PhD thesis in condensed matter physics with a strong background in surface science under ultra-high vacuum. A good expertise in near-field microscopies and/or photoemission is required. Knowledge of French language is not a mandatory.

CV and recommendation letters or contacts should be sent to:
Rémi Lazzari, lazzari@insp.jussieu.fr, Tel: (33) 1 44 27 46 28 / (33) 1 44 27 2316
Gregory Cabailh, cabailh@insp.jussieu.fr, Tel: (33) 1 44 27 46 28 / (33) 1 44 27 2316
Jacques Jupille, jupille@insp.jussieu.fr, Tel: (33) 1 44 27 46 46
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