Post-doctoral position in 4D STEM

Project:	**Application and development of 4D STEM imaging for the analysis of polarised specimens**
Location:	**Groupe de Physique des Matériaux (GPM), Saint Etienne du Rouvray (France)**
	http://gpm.univ-rouen.fr/fr
Contact:	**Williams Lefebvre (williams.lefebvre@univ-rouen.fr)**

The GPM has a long experience in the conception of Atom Probe Tomography (APT) and of its coupling with other techniques, including STEM and TEM. Whereas recent instrumental developments of STEMs allow combing high-resolution imaging with mapping of physical properties, APT remains the only techniques able to reconstruct volumes of materials with atomic sensitivity [1]. Nevertheless, APT suffers from artefacts limiting spatial resolution. A way to overcome its limitations would be to image APT specimens at the nanometre scale during their analysis in APT but this is not yet possible. A very challenging task would hence be to combine APT and TEM in a single instrument, in order to image APT specimens but also to access a much deeper and complete characterization of nano-objects [2].

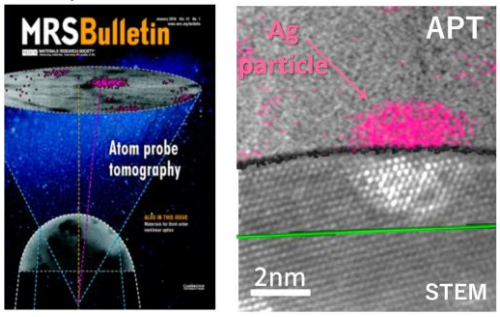

Illustration of correlative analysis of Ag-nanoparticles in aluminium by atom probe tomography and scanning transmission electron microscopy, highlighted in MRS Bulletin 41 (2016) [3].

In the framework of a new project (*Fusion SATMET)*, GPM has recently acquired a new STEM equipped with a time resolved direct detection camera, electron precession and advanced softwares allowing for orientation mapping. Preliminary work has allowed the design and fabrication of original TEM holders that allow to reproduce the condition of APT in STEM, i.e. application of a high voltage (DC + pulsing) to a sharp needle at cryogenic temperature. Beyond the coupling with APT detection in STEM, a main axis of the project is to take advantage of 4D STEM methodologies to extract a maximum of information such as: i) the electric field mapping in and around the polarised specimens; ii) evolution of electric field distribution during the sequence of field evaporation of specimens; iii) the mapping of crystal defects (e.g. grain boundaries, dislocations).

We are now seeking a post-doctoral fellow that will rapidly be able to produce original results that shall be published from the first year of the fellowship. Candidates must hold a PhD in materials sciences. A strong background in transmission electron microscopy is highly recommended. Skills in coding will be appreciated (e.g. python, MatLab, c++). Previous experience with atom probe tomography and/or specimen preparation in FIB SEM is not mandatory but might be considered interesting.

The duration of the post-doctoral fellowship is 1 year (+1 renewable year possible), starting autumn 2022 or earlier. This post-doctoral fellowship is granted by the European Union (ERDF) and Normandy Regional Council in the framework of RIN Tremplin Fusion SATMET.
Interested candidates should send a CV, a letter of motivation and the names of 2-3 references to williams.lefebvre@univ-rouen.fr

[1] W. Lefebvre-Ulrikson, F. Vurpillot, X. Sauvage, Book : *Atom Probe Tomography: Put Theory into Practice,* Academic Press (2016). ISBN: 9780128047453
[2] F. Vurpillot, W. Lefebvre et al. MRS Bulletin 41 (2016)

Cofinancé par l'Union européenne
RÉGION NORMANDIE