

16-month Postdoctoral position – Institut Pprime

Département Physique et Mécanique des Matériaux (DPMM)

Functionalization of nanolaminated transition metal carbides and related 2D materials.

Contacts: marie-laure.david@univ-poitiers.fr and vincent.mauchamp@univ-poitiers.fr

Context: A 16-month postdoctoral position is available, starting from February/March 2019, at the Pprime Institute (UPR CNRS, Université de Poitiers, ISAE-ENSMA, Département Physique et Mécanique des Matériaux - DPMM). The DPMM of the Pprime Institute has been interested for several years in layered transition metal carbides or nitrides – so-called MAX phases¹ - and their recently discovered 2D derivatives – so-called MXenes² - for diverse applications including energy storage and conversion. Our expertise goes from the elaboration of these materials to the characterization of their physical properties using a combination of experiments and first-principles simulations.³⁻⁷

Scientific project: The aim of this project, which is part of the NanoTrans FEDER project, is to elaborate and functionalize new MAX phases/MXenes using ion implantation in order to synthesize magnetic nanolaminates or 2D systems with original and controlled properties (*e.g.* by implantation of Mn). This work will be based on the expertise that we developed on the characterization of irradiation-induced modifications in MAX phases particularly. The obtained materials will be characterized using the different facilities available at Pprime (*e.g.* Transmission Electron Microscopy, electron spectroscopies, XRD) and through different national and international collaborations.

References : ¹P. Eklund et al., Thin Solid Films **518**, 1851-1878 (2010) / ²B. Anasori et al., Nature Reviews Materials **2**, 16098 (2017) / ³M. Bugnet et al., Acta Materialia **61**, 7348 (2013) / ⁴W. Yu et al., Acta Materialia **80**, 421 (2014) / ⁵D. Magné et al., Phys. Rev. B **91**, 201409(R) (2015) / ⁶D. Magné et al., Phys. Chem. Chem Phys. **18**, 30946 (2016) / ⁷X. Wang et al., J. Mater Chem A **5**, 22012 (2017)

Profile: We are looking for a well-motivated postdoctoral researcher, with strong skills in solid state physics, in particular in the ion-matter interaction domain. Strong skills in X-ray diffraction and analytical transmission electron microscopy are required. Extra skills in electronic structure calculations and in the characterization of the magnetic properties of solids would be appreciated.

The net salary will be around 2140 € per month (for a junior candidate).