16-month Postdoctoral position – Institut Pprime

Département Physique et Mécanique des Matériaux (DPMM)

Elaboration and functionalization of 2D-transition metal carbide

A 16-month postdoctoral position is available, starting from Octobre 2018, 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 phases[1] - and their recently discovered 2D derivatives – so-called MXenes[2] - for diverse applications including energy storage and production. 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] 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 (i) synthesize magnetic nanolaminates with original properties (*e.g.* by implantation of Mn), (ii) use irradiation and defect engineering as a new approach for the exfoliation of the MAX phases into MXenes (the standard methods are essentially based on chemical treatments). 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 :

[1]P. Eklund et al., Thin Solid Films **518**, 1851-1878 (2010)

[2]B. Anasori et al., Nature Reviews Materials **2**, 16098 (2017)

[3] W. Yu et al., Acta Materialia **80**, 421 (2014) / D. Magné et al., Phys. Rev. B **91**, 201409(R) (2015) / D. Magné et al., Phys. Chem. Chem Phys. **18**, 30946 (2016)

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.

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