POSTDOCTORAL RESEARCH POSITION (18 months) AT UCCS
(CNRS UMR 8181/University of Artois-France)

Nanoscale Electrical Characterization of Ferroelectric Organics and Fabrication of Nano-sized Tunnel Junctions by Atomic Force Microscopy

This position is offered by the Unit of Catalyst and Solid State Chemistry (UCCS) at the University of Artois (Lens, France) within the Thin-films-and-Nanomaterials team (http://www.uccs.univ-artois.fr/). The work settles within the framework of the FEOrgSpin project (*Ferroelectric control of organic/ferromagnetic spinterface*) funded by the National Research Agency (ANR) in partnership with IJL/Nancy, SPINTEC/Grenoble, IPR/Rennes and UCCS/Lens (https://anr.fr/Project-ANR-18-CE24-0017). The supervisors at UCCS will be Prof. Rachel Desfeux, Dr. Anthony Ferri and Dr. Antonio Da Costa. A detailed project overview may be found below.

Job description

The post-doc researcher will directly be involved in the nanoscale electrical characterization of ferroelectric organic layers by means of Atomic Force Microscopy (AFM) tools. She/He will investigate polarization switching properties and electrical conductivity of the synthesized organic barriers by using Piezoresponse Force Microscopy (PFM) and conductive-AFM (c-AFM). More specifically, the post-doc researcher will be in charge of the fabrication of nano-sized tunnel junctions by conductive-tip AFM (CT-AFM) technique in order to accurately control the organic barrier thickness. The candidate will interact and collaborate with the consortium teams of the FEOrgSpin project.

Candidate profile/Required competences:

We seek a candidate with a PhD degree in a subject of relevance for conducting the project (Materials Science, Solid State Chemistry, Condensed Matter Physics, …). The candidate will have a strong experimental experience in AFM. Preference will be given to applicants having strong experience in electrical modes such as PFM and c-AFM. Backgrounds in ferroelectrics, related macroscale electrical measurement methods, fabrication processes, structural, chemical, physical characterizations of thin films or/and organic materials will be appreciated. The candidate should have good communication skills to interact with the project partners. She/He should speak English or French with the ability to write well-organized papers in English.

How to apply: send your complete application form including CV, cover and recommendation letters, list of publications and copies of the relevant degrees to the contact below.
Deadline for application: January 15, 2020
Start date: March 1, 2020
Contract period: one year and a half *(temporary position of 18 months - Contract type: full time)*
Workplace: UCCS (CNRS UMR 8181), Université d'Artois, Faculté des Sciences Jean Perrin, Rue Jean Souvraz, 62307 Lens, France
Remuneration: around 2350 € net monthly
This work is supported by a public grant overseen by the French National Agency (ANR).
Contact: Prof. Rachel Desfeux, University of Artois, E-mail: rachel.desfeux@univ-artois.fr, Tel: +33(0)321791771

FEOrgSpin project

Hybrid ferromagnetic metal/organic interface, as known as “spinterface”, can exhibit highly efficient spin-filtering properties and presents a promising class of materials for future spintronic devices. However, the spin-polarization of spinterface at Fermi level can be different or even opposite in sign to that of adjacent ferromagnetic electrode. Our recent achievement demonstrates that the spin-polarization at poly(vinylidene fluoride) (PVDF)/Co spinterface can be actively modulated (even change the sign) by switching the ferroelectric (FE) polarization of PVDF. In the FeOrgSpin project, we aim to expand our knowledge on ferroelectric control of spin polarization at different FE-organic/ferromagnetic spinterface and develop novel functionalities of spintronic device based on ferroelectric organics.

Consortium (4 partners) gathers teams from:

i) Jean Lamour Institute (IJL/Nancy): strong expertise on the preparation of FE organic materials and MBE growth of FM on organic materials, the spin-transport characterization in magnetic tunnel junction and the fabrication of spin-injector for spin-LED;

ii) SPINTEC lab (SPINTEC/Grenoble): strong expertise on the ab initio calculations of electronic structure and transport properties of MTJs, comprising FM/FE organic material interfaces and the spin pumping in ferromagnetic oxide;

iii) Physics Institute of Rennes (IPR/Rennes): strong expertise in the metal deposition with Buffer Layer Assisted Growth method (BLAG), in electron spectroscopies, in ballistic electron emission microscopy, Hanle effect, I(V) and C(V) transport measurements;

iv) Unit of Catalyst and Solid State Chemistry (UCCS/Lens): strong expertise in the nanoscale characterization of piezoelectric/ferroelectric thin films and nanostructures.