

Post-doctoral position at the LMGP Laboratory in Grenoble

Two-dimensional MXene Monolayers and MXene-based Heterojunctions

Job description:

We are looking for a Postdoctoral scientist in the field of emerging 2D electronic materials called MXenes, focusing on their synthesis and their integration in electronic devices using nano-fabrication technologies. This position is part of a 3 year “chair-of-excellence” project funded by the nanoscience Foundation of Grenoble-Alpes University awarded to Prof. M. W. Barsoum (Drexel University).

Context

MXenes are two-dimensional (2D) carbides synthesized from nanolamellar materials called MAX phases. These functional nanomaterials form the building blocks of an impressive number of potentially useful industrial applications: they have already demonstrated extreme capacitance values, high electrical conductivities, better electromagnetic shielding ability than any other material, among many other unique and exciting properties and characteristics with high technological potential.

However, there is a clear lack of understanding of their electronic transport properties. Yet the latter ultimately control the performance of most of the applications cited above. Also lacking is a precise appreciation of the role of surface functionalization on performance. Our project will fill this gap by producing a wealth of data – in mostly large flakes – that can shed light on the problem. Our goal is to develop appropriate technological processes to isolate large area single MXene flakes with tunable surface functionalizations, and to characterize their properties – mostly magnetoelectronic and optoelectronic – as well as properties of vertically stacked hetero-junctions with various other 2D materials, such as graphene or BN. The end goal is to get a quantitative and qualitative overview of the intrinsic properties of functionalized MXenes, and to fabricate heterojunctions or gated devices with unique characteristics. This will allow us, in turn, to identify and circumscribe the application domains where those new 2D materials offer sustainable competitive advantages over alternate competing materials.

Job description

Project is divided into the main following tasks: 1/ crystal growth, 2/ exfoliation, 3/ surface termination control, 4/ stacking and heterojunction formation, 5/ device processing, 6/ advanced nanocharacterization of MXenes and heterostructures and devices. The competitive postdoctoral candidate will intervene in steps 2/ to 6/. He will work within the frame of a strong collaboration between LMGP and the Néel Institute, CNRS, Grenoble. Work will be shared with a PhD student hired in 2017, master students and the involved permanent staff, composed of T. Ouisse and M. W. Barsoum (invited) at LMGP, and V. Bouchiat and J. Coraux at the Néel Institute.

Starting date: spring 2018 - Duration: 12 months

Research profile & skills (required / highly desirable):

Strong background in all, or some, of the following: materials science, solid state chemistry, solid state physics, nano-fabrication technologies associated with a clean-room environment, magneto-transport, physics of low-dimensional systems, characterization techniques for 2D materials. Organization skills and ability to work within an interdisciplinary project are much desired.

Scientific environment:

The candidate will work within the LMGP, Materials and Physical Engineering Laboratory and at Néel Institute in Grenoble. Located in the heart of an exceptional scientific environment, the LMGP offers the applicant a rewarding place to work.

LMGP Web Site: <http://www.lmgp.grenoble-inp.fr/>

Salary:

Pay scale of a fixed term post as a CNRS/G INP Researcher (depending on the candidate's experience) around 1920 euros/month.

Application procedure:

Please send motivation letter, CV and list of publications and academic references to:

Thierry Ouisse, Professor, Grenoble INP, thierry.ouisse@grenoble-inp.fr, +33 4 56 52 93 27 or

Michel W. Barsoum, Professor, Drexel University, barsoumw@drexel.edu