

Post-doctoral research associate position open

Elaboration of BN nanostructures for energy and environmental application

Duration: 12 months with possible 6 months extension – **Starting:** around September 2017

Since 2013, research on the atomic layer deposition (ALD) is carried out at the Laboratoire des Multimatériaux et Interfaces (LMI), a joint research laboratory between the CNRS (French scientific research center) and the University of Lyon. The research performed at LMI focuses on the ALD elaboration of heterostructures, their characterization and investigation of their physical properties.

Particular attention is devoted to the investigation of new precursors and approaches in order to fabricate complex nanostructures based especially on boron nitride (BN) material. Indeed, hexagonal BN nanostructures such as nanotubes and nanosheets are very attractive materials with application in various areas such as the energy and the environmental domains.

Recently we developed and we study a new ALD approach for BN. Indeed, the few existing ALD processes being mostly based on ammonia and/or halide precursors; new ALD approach using alternative precursors was proposed to avoid corrosive and/or irritant reactant and by-product as well as to improve the film quality. The polymer derived ceramics (PDCs) route has thus been successfully transposed to ALD. This novel process allows conformal and homogeneous deposition of BN films with a thickness control at the atomic scale. Very low deposition temperature is used followed by high temperature treatment to densify the layer. On the one side the very low deposition temperature allows coating of various substrates paving the way to the fabrication of novel functional BN structures in which use of template is required and composites. On the other side, further investigation will be needed to decrease the temperature of the post-treatment while improving the crystalline quality. For this, alternative optical and thermal treatment will be considered.

The candidate will work on the development and use of this new process in order to fabricate high quality complex nanostructures.

One part of the work will be dedicated to the optimization of the post treatment to improve the crystalline quality. Efforts will be devoted to lowering of the annealing temperature and investigation of optical treatment, especially IR rapid thermal annealing. The crystallization process will also be studied. In situ characterization of the ALD process and setting of in situ post-treatment will be initiated.

On the other hand, BN-based complex nanostructures that required use of template will be elaborated in view of application in hydrogen storage and/or water filtration. Especially carbon-BN heterostructures using carbon nanotubes and graphene supports will be investigated.

Candidates should have a PhD in chemistry, material sciences or close related field. Knowledge in either ALD/gas phase deposition or in PDC/boron chemistry as well as in material characterization such as SEM, TEM, XRD, XRR are required. Experiences with either in situ characterizations or hydrogen storage/water filtration will be beneficial.

For application, CV, cover letter and reference must be sent to the contact address.

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