

## **Synthèse de nouveaux précurseurs pour le dépôt par couche atomique (ALD) de nitrure de bore 2D**

### **Synthesis of Boron Nitride Precursors suitable for atomic layer deposition of 2D-BN**

The scientific interest for two-dimensional boron nitride (2D-BN) material, especially as thin film and nano-/hetero-structures, is growing every year owing to its potential use in various domains such as microelectronic, energy and environment. Atomic Layer Deposition (ALD) is a technique of choice for fabrication of thin films and complex nanostructured materials. Indeed, based on self-limited gas/surface reactions, ALD is a unique technique for depositing conformal and homogeneous thin films (1-100 nm) on flat as well as on high aspect ratio substrates. Recently, based on polymer derived ceramics chemistry, we developed a low temperature two-step ALD process of BN. It permits access to various h-BN complex nano-/hetero-structures using a wide range of substrates. Nevertheless, high temperature annealing is required to obtain high crystalline quality BN. In order to lower this temperature but also to control the structure of 2D-BN material at the atomic scale by incorporating different hybridized B-N bonds, particular attention is required to the synthesis of specific and non-commercial boron nitride precursors than can be used in ALD.

An important part of the PhD candidate's work will focus on the synthesis and characterization of BN precursors such as aminoborane, borazine-derivative and iminoborane. Particular attention will be given to their thermal properties (stability, volatility...) as they must fulfil specific requirements like self-inertness, volatility and thermal stability to be used in ALD. The candidate will then investigate the ALD of BN from the synthesized reactants.

#### ***Techniques***

Synthesis techniques: synthesis under inert atmosphere (glovebox, schlenk line), Atomic layer deposition, inorganic synthesis.

Characterization techniques: NMR (mainly  $^1\text{H}$  and  $^{11}\text{B}$  NMR), IR and UV spectroscopies, thermal analysis (TGA, DSC), X ray reflectometry, ellipsometry, microscopy (AFM, MEB, MET), XPS.

#### ***Skills***

The candidate must be graduated in Chemistry and be motivated by an interdisciplinary work ranging from material/precursor synthesis to chemicophysical characterizations. Strong background in chemistry as well as autonomy, organization in work and good English knowledge are sought after.

#### ***Contact***

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