



Post-doctoral research associate position open

Synthesis of Boron Nitride Precursors for Fabrication of sp^2 - sp BN network

Duration: 18 months – **Starting:** As soon as possible and not latest than 2023, April 1st

Within the 2D family, hexagonal Boron Nitride (hBN) with an atomic arrangement close to graphene attracts a growing interest as it is considered for participating in the development of graphene-based electronic devices. hBN is also one of the only inorganic materials capable of retaining its intrinsic properties while withstanding harsh long-term aging conditions. However, hBN is an insulator, which limits its application areas. Controlling the structure of BN at the atomic scale by incorporating different hybridized B-N bonds would overcome this limitation.

The CNRS “BRONPOSAUR” project aims at the incorporation of sp hybridized BN bonds into a sp^2 BN network as it is expected decreasing the band gap of the BN material and influencing the ionic-dipole character of the bonding and the anisotropic behavior. Fabrication of such sp^2 - sp BN network requires custom precursors that must be carefully chosen to allow adequate hybridization.

The post-doctorate will thus synthesize designed non-commercial BN precursors. Efforts will be devoted to the synthesis of reactants that contain or lead to sp -BN bonds; the sp -BN bond presents a high reactivity, and maintaining the hybridization might be challenging. In this regard, iminoborane and poly(iminoboranes) are attractive; nevertheless, they remain difficult to handle. The proposed interfacial synthesis might overcome this issue: The sp -BN precursor will be kept “isolated” in its solvent, and only reaction at the liquid interface with space confinement is expected. The synthesized precursors will be characterized (structure, purity...) and their chemical reactivity toward sp^2 -BN reactants (e.g. borylborazine), which are available in the lab, will be investigated in solution. The post-doctoral work can be divided into 3 practical objectives.

Obj. 1 Synthesis and isolation of a couple of reactants that will provide sp -hybridized B and N atoms. Particular attention will be paid to iminoboranes.

Obj. 2 Investigation of the chemical reactivity of the obtained precursors toward sp^2 -BN reactants, such as borazine and its derivatives, to form sp^2 - sp BN species.

Obj. 3 Control of the polymerization of the synthesized reactants to form sp -BN chain of tunable length.

The candidate will be part of the Molecular Inorganic Chemistry and Precursors (CIMP) team and will work under the supervision of Dr. Catherine Marichy and Dr. Béragère Toury. The position is supported by the CNRS Emergence project “BRONPOSAUR”.

Candidates should have a PhD in chemistry. Knowledges in inorganic or organic synthesis and especially in boron chemistry and synthesis under inert atmosphere, as well as in characterization techniques like NMR, IR and mass spectroscopies are required.

For application, motivation letter, CV, list of publications and contact details of minimum two referees must be sent to the contact address.

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