

Boron nitride *nano*-ceramics for energy, environmental and health applications

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Abstract

The development of new materials for near-future technological challenges is strongly dependent on the elaboration of ceramics with suitable morphologies, shapes and properties. This goal can be achieved by both the utilization of non-conventional chemical methods and the related preparation of tailored precursors. In the case of non oxide ceramics, the pyrolysis of preceramic precursors is a useful process for preparing materials with a controlled chemical composition and in complex shapes. The general strategy can be described as a molecule-to-ceramic conversion, involving a complex sequence of physical and chemical modifications. In this contribution, several examples of Polymer Derived *nano*-Ceramics will illustrate this method as well as their use in energy applications, particularly for Hydrogen storage.

On another hand, 2D materials such as graphene and boron nitride nanosheets are very attractive for many applications particularly as sensors, electronics, adsorbents and catalysis devices. In the case of boron nitride, novel properties can arise from BN nanosheets (BNNS) due to the high surface area and the edge structures. Here, we used the exfoliation as the main tool for the creation of controlled two-dimensional nanostructured interfaces in order to investigate their performances in energy, environmental and health applications.

Short Bio/CV



Philippe MIELE became Assistant Professor (1994), and then Professor at the University of Lyon. He was group leader in the Laboratory of Multimaterials and Interfaces (UMR 5615) and Lab Head from 2003 up to 2010. In fall 2010, he joined the European Institute of Membranes (UMR 5635) with a part of his former group. In 2011, he has been appointed to his present position as Lab Head. Its research interests lie in boron chemistry and particularly in the development of molecules and materials for energy applications, with a focus on boron-based nitride materials. He is mostly recognized as an expert in the field of non-oxide advanced ceramics using the Polymer Derived Ceramics route. In fall 2016, Philippe MIELE has co-authored around 220 papers in international journals, 12 patents and has given 35 invited talks in international congresses. In 2011, he has been elected at the "World Academy of Ceramics" (Academician) and is affiliated with the class "Science". In 2016, he was nominated “senior member” at the “Institut Universitaire de France” (IUF) following a previous nomination as “junior member” in 2003.