PREPARATION OF EXFOLIATED BLACK PHOSPHORUS AND ITS GAS ADSORPTION PROPERTIES

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2D materials are very promising in nanodevice applications due to their surprising properties such as high electric mobility, outstanding structural properties and large specific surface area. [1] Recently, phosphorene (Figure 1), the all-P counterpart of graphene, has been prepared starting from black phosphorus (BP). Small amounts of single and few layers sheets of the new material have been obtained by either micromechanical cleavage (Scotch tape method) or liquid exfoliation.[2]

Almost nothing is known about the reactivity and the physico-chemical properties of this new fascinating material and only sparse theoretical [3] and experimental [4] studies have been reported so far. The former include computational analysis addressing the reactivity of phosphorene towards small molecules such as O_2, H_2O, CO_2, CO, NO_x, etc.

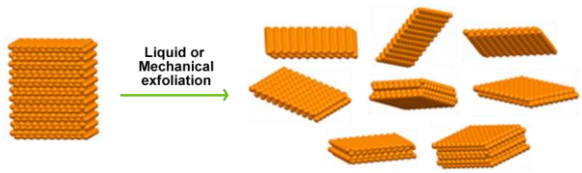

Figure 1. Exfoliation of black phosphorus

In this communication, we present our first results on this subject and firstly describe the adsorption properties towards different gaseous molecules, such as CO_2, CO, O_2 and H_2 by BP and few layers phosphorene.

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