Graphene-based nanosensors for perceiving molecular systems

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Although most of the buzz created after graphene discovery points mainly to the idea that a promising substitute for silicon perhaps has emerged, still we are far away from fabricating graphene transistors at commercial level. Nonetheless graphene can act in many other application fields and some of them are about to reach commercial-scale production. For instance, sensor industry has been looking at graphene with great interest. Previous works have reported that graphene is an excellent host material for sensing numerous chemicals and gaseous molecules [1,2]. Moreover, the sensing abilities of graphene can also benefit other important scientific fields such as medicine and biology since graphene can also successfully perceive the presence of biomolecules, e.g. DNA strands [3]. In this research front we use robust numerical methods to model graphene reaction while stimulated by foreign objects. A host graphene sheet is exposed to different types and amounts of impur ities such as organic- and bio- molecules. The adsorption processes are treated dynamically or statically from where prominent information about the graphene/molecule interaction is inferred. In particular, we illustrate in detail how graphene membranes can effectively work as nanoelectromechanical mass-sensor devices [4]. Our results confirm the potential use of graphene as promising mass/chemical sensors operating with molecular precision and selectiveness.

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