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Novel 2D materials

The discovery of the graphene in 2004 by Novoselok and Geim opened the way to the discovery of 2D materials´s family called Xenes, these materials that are in focus due to their ultimate thickness and extraordinary properties. X represents the name of the element and "ene" comes from graphene. These materials, which include borophene, silicene, phosphorene, germanene, and stanene, all share a buckled or corrugated shape—unlike graphene's flat sheets—and sport atoms arranged in a honeycomb lattice. Certainly, driven by the unique properties of ultrathin materials and their potential for new applications, researchers are crisscrossing the periodic table in search of new examples. We will review the Xenes and compare in detail their unique structural, electronic properties etc. in order to understand their possible applications.

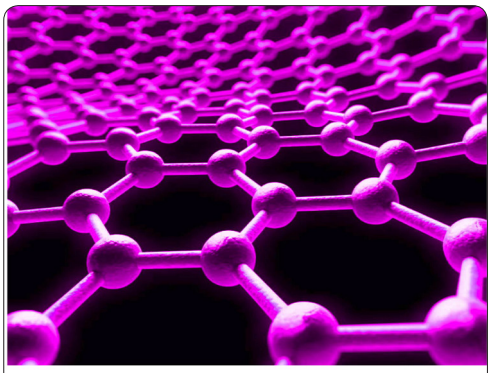

Fig. 1- General optimized geometry of the X-enes 2D materials.
The buckling parameter is different for graphene, silicene, germanene,stanene…

Recent Publications

1. M Ezawa et al. (2018) Fundamentals and functionalities of silicene, germanene and stanene La Rivista del Nuovo Cimento. 41(3):175-224.
2. J I Cerdá (2016) Unveiling the pentagonal nature of perfectly aligned single-and double-strand Si nano-ribbons on Ag (110) Nature Communications. 7:13076.
3. M E Dávila et al. (2016) Elemental group IV two-dimensional materials beyond graphene. In: Semiconductors and Semimetals. Doi:10.1016/bs.semsem.2016.04.003.
4. A A Yaroslavtsev et al. (2016) Insight into the spin state at the surface of LaCoO3 revealed by photoemission electron microscopy. Physical Review B: Condensed Matter and Materials Physics. 93:155137.
5. M E Dávila and G Le Lay (2016) Few layer epitaxial germanene: a novel two-dimensional dirac material. Nature Scientific Reports. 6:20714.

Biography

María E Dávila received her PhD in condensed matter physics from the University Auronoma of Madrid, Spain in 1996, followed by a Postdoctoral Fellowship at the University of Uppsala and KTH in Sweden. She joined the ICMM-CSIC Spain in 1998 where is currently working. Her research focuses on the synthesis and characterization of low-dimensional materials with special emphasis on semiconductors. Her interests include determining the structural and electronic structure of those materials. She is an expert in the use of synchrotron radiation techniques to explore the physics and chemistry of low-dimensional materials.

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