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Beyond graphene: Novel2D graphene-like layered materials

Graphene is an exciting 2-dimensional material with extraordinary properties likely to be used in future applications. On the other hand, there are intrinsic limitations of graphene, including its lack of a band-gap which makes its use in certain applications, such as transistors, problematic. The family of 2D graphene-like layered materials is rapidly expanding, with some gaining favor with researchers because they possess a band-gap and can be gated by external electric field; thus they out perform graphene for certain applications. These include the atomically thin form of molybdenum disulfide (MoS2), tungsten disulfide (WS2), boron nitride (BN), and several dozen others.

Thin film MoS2, for example, has a high level of photoluminescence, a high current ON/OFF ratio, and a high mobility. These advantageous properties can lead to the creation of low-power transistors and optoelectronic devices.

The graphene-like 2D materials may be isolated down to the molecular level using mechanical exfoliation, liquid processing, and Chemical Vapor Deposition. The methods of production are in many cases industry standard, so the ability to create high-quantities of the materials is likely.

In this talk, I will review the properties of these emerging graphene-like 2D materials, as well as their methods of production and potential applications.

Biography

Elena Polyakova is the Chief Executive Officer of Graphene Laboratories, Inc., a company is founded in 2009. Dr. Polyakova holds Master's and Bachelor's degrees in Physics and Applied Mathematics from the Moscow Institute of Physics and Technology, as well as a Ph.D. in Physical Chemistry from the University of Southern California. Upon graduation, she worked as a Postdoctoral Fellow at Columbia University from 2005 until founding Graphene Laboratories. Her entrepreneurship has earned the title of Mass High Tech Woman to Watch in 2011. She continues to successfully lead Graphene Laboratories, a rare success story of nanomaterial commercialization.

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