Studying 2D Materials Intercalation and Heterostructures

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Abstract

The unique anisotropic structure of layered compounds enables the isolation and rational synthesis of atomic layers at moderate conditions, not possible or highly challenging to achieve with 3D crystals. Very interesting chemical and physical phenomena was elucidated in such atomic layers as a function of their phase, number of layers, stacking order, *etc*. Such layered structure allows for the relatively easy intercalation (of molecules, ions, *etc*.) at the van der Waals gaps and was widely studied in the past as a way to tune the properties (electrical, optical, magnetic, etc.) of the host material as well as employed in energy storage and catalysis applications. Despite these extensive studies on intercalation in 2D crystals and recently in few-atomic layers, there are yet many open questions related to the structure, chemical composition and properties of the intercalated materials. Here, I will describe our attempts to study the intercalation of graphitic films with metal halides. A wide range of characterization tools are being utilized in order to elucidate the intriguing relation between the host layered material and the intercalant. Stage-I intercalated graphitic films are readily obtained with a clear registry between the graphene lattice and the intercalant.

Short Biography

Prof. Ariel Ismach holds a BEng in Materials Engineering from Ben Gurion University of the Negev, and an MA and PhD in Materials and Interfaces from the Faculty of Chemistry, Weizmann Institute. He was awarded a prize from the Israel Chemistry Society for his doctoral thesis. Ariel completed a postdoctoral training at UC Berkeley and UT Austin. He joined the Materials Science and Engineering department at Tel Aviv University in 2014 where he had established a laboratory dedicated to study the growth and properties of 2D atomic-crystals. His group is working to address basic scientific questions regarding the formation and the structure-property relationship of 2D materials as well as developing new methodologies to engineer such layered materials and their heterostructures for applications in catalysis, energy storage, thermal management and photovoltaics.