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Probing and Modulating Interface Interactions in 2-Dimensional Materials and Their Heterostructures

Abstract

2-dimensional (2D) van der Waals structures built up from layered materials, such as graphene, MoS₂, and their heterostructures, have received growing attention owing to their simple fabrication by straightforward stacking and various types of band alignments. Interface interactions in 2D materials and their heterostructures are of vital importance to determine the properties of the 2D layers. In this talk, I will introduce some efforts in my group on probing and modulating interface interactions in 2D systems, including mechanically characterizing their interlayer interactions, employing surface enhanced Raman technique to probe local strains, and inducing interlayer connections by defect engineering. Lastly, I will present an example of modulating properties of a 2D semiconductor by interfacing it with an active, phase-transition material. Our results not only provide an insight to understand interface interactions in 2D van der Waals structures, but also potentially allow engineering of their properties as desired.

Keywords: 2D materials, heterostructure, interface interaction, phase transition

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