Phase Transformation and Interfacial Coupling in Heterostructures of Low-Dimensional Materials

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The rapid advances in low-dimensional materials of various crystalline symmetries and elemental compositions have generated rich functionalities. Artificially stacking or stitching dissimilar materials via construction of heterostructures further offers unprecedented potential for tailoring the properties of individual constituent and giving rise to exotic quantum phenomena. In this talk, I will first discuss how we utilize lateral heterostructures to induce phase transformation in an inorganic transition metal dichalcogenide core-shell architecture and to unravel the microscopic process of insulator-to-metal transition in a correlated organic charge transfer complex system. I will then discuss the formation of new two-dimensional (2D) Sn phases enabled by interfacial coupling on hexagonal boron nitride monolayer on metal (h-BN/metal), which potentially provides a new avenue for engineering electronic and topological properties of 2D Sn.