﻿Optoelectronics & Electronics

based on 2D Semiconductor Heterostructures

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Two-dimensional (2D) van der Waals (vdW) heterostructures built from various atomic layered materials provide an unprecedented opportunity in designing new material systems due to high-quality heterointerfaces even between non-commensurate lattices. The recent advent of semiconducting transition metal dichalcogenides (TMDCs) with excellent electrical and optical properties, combined with the ability to build artificial heterostructures, allows the realization of atomically thin semiconductor heterostructures for novel device applications as well as fundamental studies in an ultimate thickness limit. In this talk, I will present the fabrication and electrical and optoelectronic properties of various vdW heterostructures including atomically thin p-n junctions and 2D semiconductor/oxide heterojunctions. Furthermore, I will discuss the wafer-scale growth of monolayer TMDCs using metal-organic chemical vapor deposition (MOCVD) for future practical applications.