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Optoelectronics of Two-Dimensional Transition Metal Dichalcogenides

XIAODONG XU, University of Washington

Monolayer transition metal dichalcogenides (TMDs) are a new class of 2D semiconductors with the band edge at the corners of the hexagonal Brillouin zone. There has been rapid progress in demonstrating the interesting 2D excitonic properties of TMDs, such as tunable exciton charging effects, large exciton and trion binding energies, and valley exciton polarization and coherence. In this talk, I will discuss the role of excitons in solid-state light emitting devices made from monolayer TMDs, as well as intralayer and interlayer excitonic properties in both TMD bilayers and heterostructure devices. The results are relevant for energy-efficient optoelectronics based on 2D layered materials.