

# Wonderland in 2D materials

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2D layered materials exist in nature via van der Waals interaction between layers with strong covalent or ionic bonds within the layer. Motivated by metallic graphene, insulating boron nitride (BN) and semiconducting transition metal dichalcogenides (TMdCs) with various band gaps have been intensively studied. Each material reveals its own peculiar characteristics and more importantly, hybrid of such structures in vertical direction provides another degree of freedom which could exhibit unexplored new physics and performances. Synthesis of such materials in large area with a controllable thickness is a challenge. I will discuss large-area growth of graphene, BN, and other types of TMdC materials such as MoS<sub>2</sub>, WS<sub>2</sub>, WSe<sub>2</sub>, MoTe<sub>2</sub> etc. If time is allowed, optical properties of hybrid TMdCs will be further discussed.