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2D dichalcogenide electronic materials and devices

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The discovery of graphene marked the start of research in 2D electronic materials which was expanded in new directions with MoS2 and other layered semiconducting materials. They have a wide range of promising potential applications, including those in digital electronics, optoelectronics and flexible devices. Combining 2D materials in heterostructures can increase their reach even further. In my talk, I will present our recent efforts in growing 2D semiconducting transition metal dichalcogenides (TMDCs) and heterostructures using a variety of techniques such as CVD and MBE, starting from epitaxial growth of MoS2 on sapphire with a high degree of control over lattice orientation. Next, I will show our work on atomically thin rhenium disulphide (ReS_2) liquid-electrolyte gated transistors with atypical behaviour at high charge densities related to the peculiar band structure of this material. I will finish by presenting new results on spin/valley transport in semiconducting monolayer TMDC materials.