**Tunable optical/electrical properties in 2D semiconductors**

**and their applications**

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Two-dimensional (2D) van der Waals semiconductors have various potential for optoelectronic applications, thanks to their unique optical and electrical properties at an atomic layer thickness. A stable excitonic emission of monolayer 2D semiconductors at room temperature, owing to a reduced dielectric screening effect, opens up new research fields on excitonics and valleytronics. Moreover, their low dimensionality without surface dangling bonds allows for unique quantum transport phenomena via artificial van der Waals stacking. In this talk, the author introduces tunable physical properties of 2D semiconductors in terms of quantum optoelectronics, defect engineering, van der Waals interfaces, Coulomb interactions etc. By extension, the author reviews electronic and optoelectronic applications utilizing such unique tunable properties of 2D semiconductors.