# INTRODUCTION TO 2D SEMICONDUCTORS BASED ON TRANSITION METAL DICHALCOGENIDES ($MoS_2$, $MoSe_2$, $WS_2$, $WSe_2$)

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The spectacular progress in controlling the electronic properties of graphene has triggered research in alternative atomically thin two-dimensional crystals. Monolayers (ML) of transition-metal dichalcogenides such as $MoS_2$ have emerged as very promising nanostructures for optical and electronic applications for mainly two reasons.

First, the indirect bulk semiconductor $MoS_2$ becomes direct when thinned to 1ML, resulting in efficient optical absorption and emission. Second, inversion symmetry breaking (usually absent in graphene) together with the large spin-orbit interaction leads to a coupling of carrier spin and *k*-space valley physics, i.e., the circular polarization ($\sigma+$ or $\sigma-$) of the absorbed or emitted photon can be directly associated with selective carrier excitation in one of the two nonequivalent *k* valleys ($K+$ or $K-$, respectively).

In this talk I will give an overview of the physical properties of 2D semiconductors based on Transition Metal Dichalcogenides : band structure, exciton effects, optical and transport properties, and spin/valley dynamics.

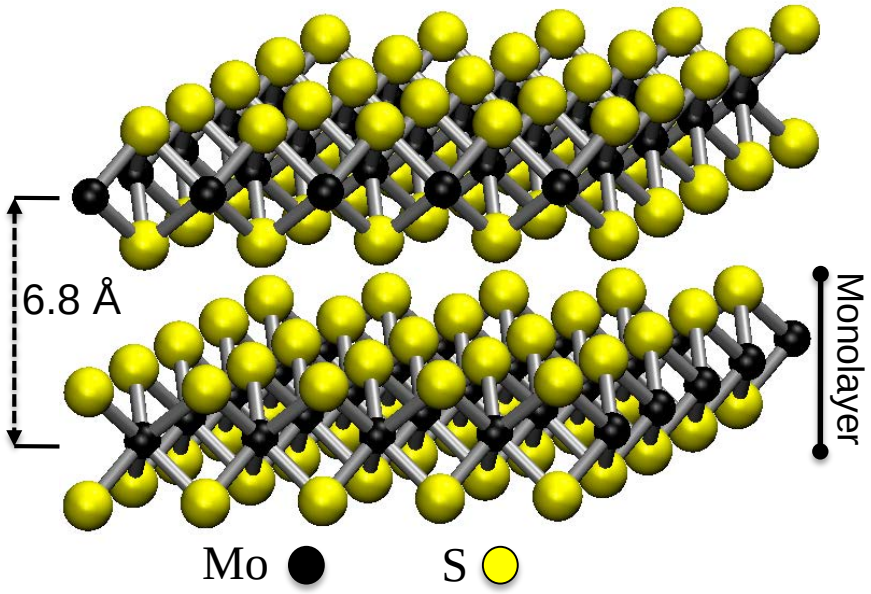


*Figure : Schematic representation of $MoS_2$*

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