

# Electrocatalysis and Charge Storage using Transition Metal Dichalcogenide based Nano-heterostructures

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Transition metal dichalcogenides (TMD) have emerged as an important class of materials for several applications. Their two-dimensional nature renders them useful in many applications ranging from optoelectronics to batteries, spintronics and catalysis.

In this talk, I will discuss the possibilities of formation of nano-heterostructures based on MoSe<sub>2</sub> – a 2D TMD and their applications for optoelectronics and catalysis, in particular water splitting. Interestingly, the TMDs can also be used as a Selenium source to passivate lead halide perovskites rendering them highly stable.

Further, the TMDs have been shown to exhibit charge separation and therefore are useful for applications in photodetectors and catalysis, in particular electrocatalysis for reactions such as the hydrogen evolution reaction or the oxygen evolution reaction. Due to the layered nature of the TMDs these can accommodate ions between the layers and therefore are very advantageous for use as capacitor or battery applications.

I will discuss a few of these possibilities.

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