# *Photoconductivity of Intercalated $MoS_2$*

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Over the last decade, a wealth of knowledge and innovation has emerged from studies of layered two dimensional materials. Beyond the discoveries of unique properties and exotic phenomena exhibited by individual materials, the scientific interest has progressed also to heterostructures that combine several materials in a stacking sequence. Such stacking sequences bear several degrees of freedom including rotational angle between layers. Heterostructures span a large combinatorial space that may enable to construct new functional materials, by design of their atomic layers sequence.

An interesting analogue to this concept is intercalation, where guest atoms are introduced into the space between adjunct layers, forming atomically thin islands or complete layers, bridging the layers of the original compound. Intercalation processes have been studied for a long time and are the technological foundation of modern energy storage devices. However, the field is still in its infancy as far as electronic and optical properties of materials are concerned - especially with respect to constructing optoelectronic devices.

Here, we discuss impact of metal intercalation on the electronic and optoelectronic of $MoS_2$ – and the electronic structure modified by small clusters or continuous layers within the lamellar van der Waals gap. The discussion will be focused on the cases of Li, Cu and Sn intercalation and the host-guest chemical interactions in relation to the photophysics.