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## Growth and fabrication of molybdenum disulfide devices

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The two-dimensional layered material MoS<sub>2</sub> is the most common transition metal dichalcogenide. The bulk MoS<sub>2</sub> is a semiconductor material with an indirect energy gap (about 1.3 eV) with strong sulfur and molybdenum metal in the plane of the monolayer valence bond function, and there is a very weak Van der Waals force between layers. The monolayer MoS<sub>2</sub> has a direct energy gap (about 1.9 eV) and an N-type semiconductor material with strong light emission characteristics, high planar electron mobility and tough mechanical properties, making it applicable applies to transistors, gas sensing detector, photodetector, battery, optoelectronic components. In the past, our laboratory successfully used CVD method to grow graphene and molybdenum disulfide films, combined with the hyper-spectral imaging for the optical properties detection of a few layers of thin film. On the other hand, we also have been successfully fabricated some nanostructures of cuprous oxide and zinc oxide. These nanostructures are made of anodized aluminum and two-beam interference technology. We expect to combine two-dimensional materials and semiconductor device fabrication into biochip through the use of biochips. Using biosensors based on semiconductor material synthesis and micro-nanostructure technology, we hope to develop a low-cost and fast response time, simultaneous detection of biosensors simple program. Recent studies have found that the change of surface stress of transition metal dichalcogenide will change its optical properties such as energy gap, absorption spectrum, even the electron mobility and induced magnetic force. The changes of these properties will enhance the optoelectronic performances of the transition metal dichalcogenide device and material properties. In this study, we will design the best transition metal dichalcogenide devices based on the previous research results. We will apply these devices to biological, gas, and photoelectric sensors and discuss the relationship between the photoelectric characteristics and stress distribution of various devices, and through the deep learning technology to enhance the photoelectric efficiency of devices.

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