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Abstract Draft

**Molybdenum disulfide deposited on APTES functionalized silicon using electrophoretic deposition.**

Abstract:

Molybdenum disulfide ( $\text{MoS}_2$ ) and other transition metal dichalcogenides (TMDCs) are of great interest to researchers for their electrical, optical, and catalytic properties. This report presents the fabrication of  $\text{MoS}_2$  thin films onto 3-aminopropyl-triethoxysilane (APTES) functionalized semiconductor (silicon) substrates by way of electrophoretic deposition (EPD). The organosilane treated silicon surface assists the formation of the  $\text{MoS}_2$  films through the Coulombic force of attraction between the positively charged  $\text{NH}_2$  APTES surface groups and the negatively charged sulfur molecules located on the edge plane of  $\text{MoS}_2$  flakes. Through functionalizing the silicon, we produced coatings of  $\text{MoS}_2$  superior in comparison to  $\text{MoS}_2$  on non-functionalized silicon. Raman spectroscopy and scanning electron microscopy (SEM) were used to confirm coverage, uniformity, film thickness, and material quality. The organosilane assisted EPD gives an economical, quick, and room temperature solution-based fabrication method for TMDC thin films that can be deposited upon insulating and semiconducting substrates.