

Deposition of maleimide molecules on MoS₂ under UHV conditions

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Nowadays there is increasing interest in performing controlled chemical reactions on van der Waals materials with several types of molecules to realize new multi-dimensional heterostructures, and open new pathways for different applications [1,2]. Recent studies demonstrated the successful covalent functionalization of transition metal dichalcogenides (TMDs) with different molecules [1,3,4]. One of these combinations is the covalent link between MoS₂ monolayers and maleimide derivatives via “click” reactions [1,3,4] due to the soft nucleophilic character of sulfur. However, this synthesis is usually made under solution in liquid environments, and an ultra-high-vacuum (UHV) approach has not yet been attempted yet. In this work we deposit benzylmaleimide molecules on MoS₂ islands grown on a substrate of graphene/Iridium (111) under UHV conditions, and explore their adsorption on the surface by means of scanning tunneling microscopy (STM). Our results indicate that, rather than forming a covalent bond on the top Sulphur atoms of the MoS₂, in UHV molecules mainly chemisorb on MoS₂ surface defects, such as mirror twin boundaries (MTB) or sulfur vacancies.

References

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Figures

