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# Fast polymeric functionalization approach for the covalent coating of $MoS_2$ layers[1]

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Moybdenum disulfide ($MoS_2$) is undoubtedly the flagship of the transition metal dichalcogenides family, due to its scalable preparation through simple exfoliation methods and a developed surface functionalization through chemical design.[2] Recent development of $MoS_2$ chemical functionalization has permitted a fine tuning of the physical and chemical properties with large impact on the processing and use of this material.[3] However, this surface covalent functionalization is often characterized by the limited density of attached molecules.

In this work, we present the covalent coating of chemically exfoliated $MoS_2$ based on the polymerization of functional acryl molecules. The method relies on the *in situ* radical polymerization and covalent adhesion of large amounts of molecules to form functional coatings.[4] In particular, we successfully implement hydrophobicity on the exfoliated $MoS_2$ in a direct, fast, and quantitative synthetic approach. The covalent functionalization is proved by multiple techniques including X-ray photoelectron spectroscopy and TGA-MS. This approach represents a simple and general protocol to reach dense and homogeneous functional coatings on 2D materials.

## References

[1] I. Gómez-Muñoz, S. Laghouati, R. Torres-Cavanillas, M. Morant-Giner, N. Vassilyeva, A. Forment-Aliaga, M. Giménez-Marqués. Submitted. DOI: 10.26434/chemrxiv.14124137.v1.
[2] Q. Tang and D. Jiang, Chem. Mater., 10 (2015) 3743.
[3] M. Morant-Giner, R. Sanchis-Gual, J. Romero, A. Alberola, L. García-Cruz, S. Agouram, M. Galbiati, N. M. Padial, J. C. Waerenborgh, C. Martí-Gastaldo, S. Tatay, A. Forment-Aliaga, and E. Coronado, Adv. Funct. Mater., 27 (2018) 1706125.
[4] M. Giménez-Marqués, E. Bellido, T. Berthelot, T. Simón-Yarza, T. Hidalgo, R. Simón-Vázquez, Á. González-Fernández, J. Avila, M. C. Asensio, R. Gref, P. Couvreur, C. Serre, and P. Horcajada, Small, 40 (2018) 1801900.

## Figures

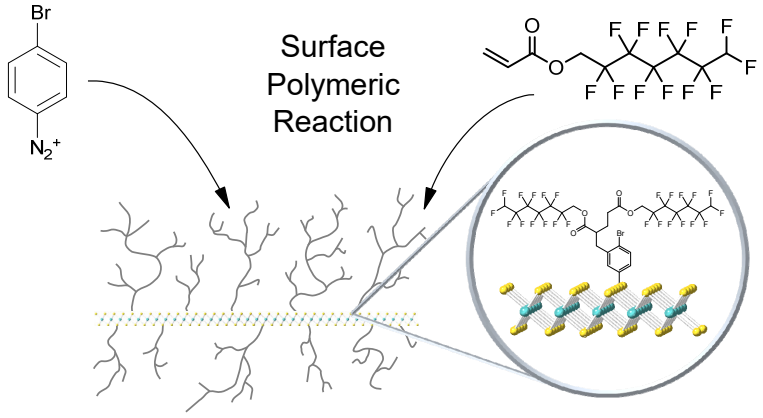


**Figure 1:** Schematic representation of the proposed polymeric reaction on $MoS_2$.