Covalently functionalized MoS_2 with dithiolenes

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Advances are required to develop functionalization routes for MoS_2, in both metallic *1T* and semiconducting *2H* phase, that will not only enable their easier manipulation and handling in liquid media, but also enhance their applicability in diverse technological fields. Inspired by our previously reported straightforward protocol for the covalent functionalization of *2H*-MoS_2 nanosheets by reaction with 1,2-dithiolane derivatives,[1,2] we developed an original functionalization methodology for covalently incorporating dithiolene units at the periphery of exfoliated *1T*- and *2H*-MoS_2 sheets. A bis(thiolate) salt that can be "custom-designed" is utilized as a ligand in a green and facile protocol, where S-vacancies located at the edges of the MoS_2 nanosheets, are filled with the dithiolene sulfur moieties (**Figure 1**).[3] IR and Raman spectroscopy, together with microscopy imaging coupled with electron energy loss spectroscopy, provide direct evidence for the chemical functionalization of the two polytype MoS_2 materials. This methodology that can be potentially applied for the modification of other transition metal dichalcogenides, incorporates dithiolene chemistry and its outstanding applications in materials science.

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References

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Figures

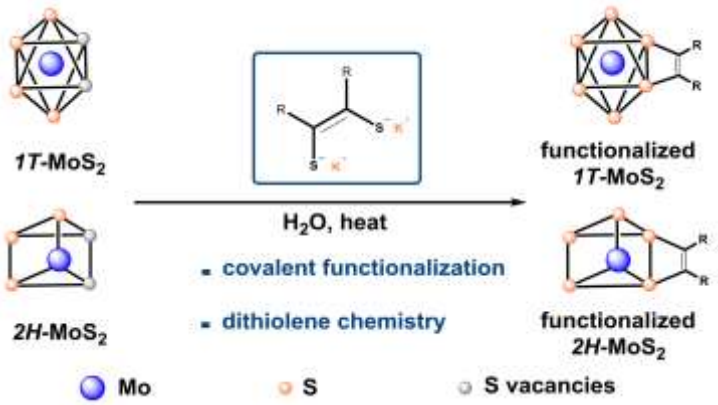

Figure 1: Covalently functionalized *1T*- and *2H*-MoS_2 with dithiolenes.