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Site selective oxidation of monolayered liquid-exfoliated WS_2 by shielding the basal plane through adsorption of a facial amphiphile

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In recent years, various functionalization strategies for transition metal dichalcogenides have been explored to tailor the materials' properties and to provide anchor points for the fabrication of hybrid structures. However, often functionalization approaches are carried out in the presence of additional components (e.g. stabilizers) other than the reagents which are often neglected. In this report,[1] new insights into the role of the surfactant in functionalization reactions are described. Using the spontaneous reaction of WS_2 with chloroauric acid as a model reaction, the regioselective formation of gold nanoparticles on WS_2 is shown to be heavily dependent on the surfactant employed. A simple model is developed to explain the role of the chosen surfactant in this heterogeneous functionalization reaction. Variations in the surfactant coverage for classical and facial amphiphiles are identified as the crucial element that governs the dominant reaction pathway and therefore can severely alter the reaction outcome. This study shows the general importance of the surfactant choice and how detrimental or beneficial a certain surfactant can be to the desired functionalization.

References

[1] Grieger et al. *Angew. Chem. Int. Ed.* 59 (**2020**), 13785–13792. doi.org/10.1002/anie.202005730 (Front Cover: 13665–13665. doi.org/10.1002/anie.202007849)

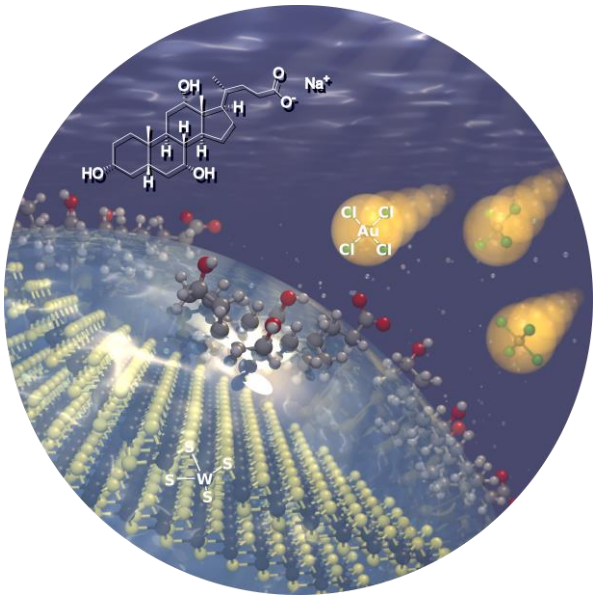

Figure 1: The heterogenous reaction of chloroauric acid at the nanosheet-solution interface reveals that the employed surfactant plays a significant role in governing the reactivity of the nanomaterial and consequently on the functionalization outcome.