Porous 2D Material architectures from liquid-phase exfoliated inks *via* templating methods

Felix Boll
Matteo Crisci, Dr. Teresa Gatti
Center for Materials Research, Justus-Liebig Universität, Heinrich-Buff Ring 17, Giessen, Germany
Felix.Boll@phys.chemie.uni-giessen.de

2D materials became a reliable material class for use in (opto)electronic devices since their discovery in 2004,, , when graphene was produced and its electronic properties were investigated in the first place.[1] Materials like WS_2 and MoS_2 in contrast to graphene show semiconducting properties with an indirect-to-direct band gap transition from the bulk to the monolayer material.[2] Liquid phase exfoliation (LPE) of bulk WS_2 and MoS_2 crystals is a convenient method for large scale and environmentally friendly production of few-layers transition metal dichalcogenides (TMDs) colloidal inks. These can be used for versatile thin film processing employing different kinds of coating and printing methods.[4]
We are interested in employing green solvents for LPE, like water and isopropanol, resorting to exfoliation techniques like tip sonification and shear mixing.
The combination of the thus obtained 2D TMD inks with different templating species or polymeric binders, couple to cross-linking strategies allow us to produce porous thin films of 2D nanosheets with high inter-particle connection. These architectures have great perspectives to be used in electrode/capacitor systems for application in energy storage devices.[6]

References

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[4] Kriegel, I. et al.*J. Phys. Chem. C* **2020**, *124*, 8000–8007.

Figures

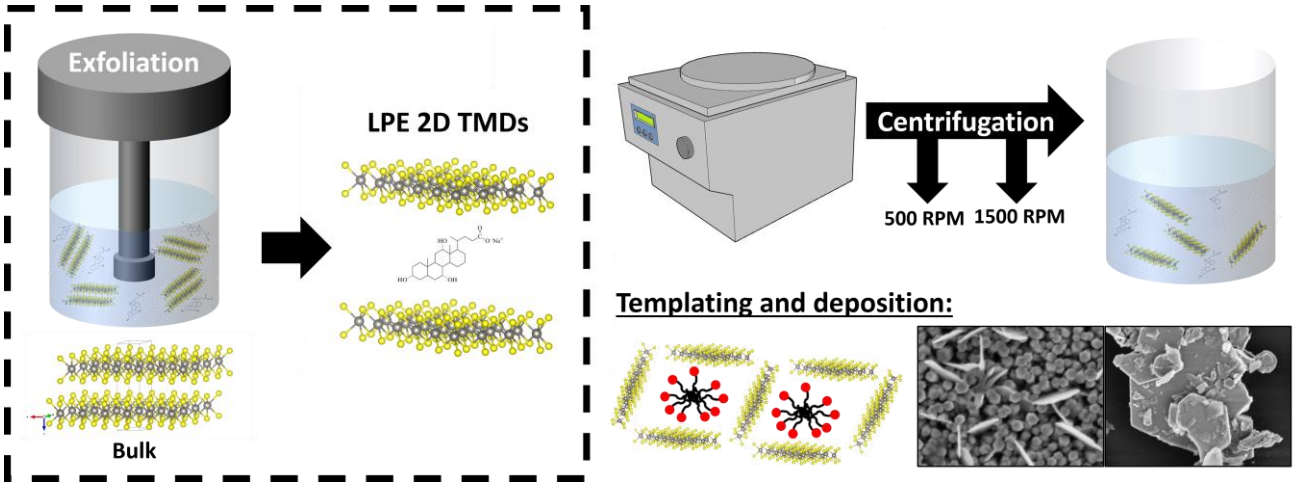

Figure 1: Exfoliation process of transition metal dichalcogenides with followed centrifugation for deposition of porous TMD mono-/few layer materials on scaffolds and templates for particle cross linking.