Growth of $MoTe_2$, WTe_2 and $PtTe_2$ films for electrical and electrochemical applications

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The interest in transition metal ditellurides has grown hugely over the last number of years, having previously been much less explored than sulfide and selenide TMDs. This has led to reports of a host of interesting properties and applications such as $MoTe_2$ for phase-change applications, WTe_2 as a possible interconnect material and WTe_2 showing giant magnetoresistance.[1][2]
This work demonstrates an efficient method to produce phase-pure 1T' $MoTe_2$ films at temperatures as low as 450˚C. This is achieved through reaction of pre-deposited Mo and electrodeposited Te layers in an inert atmosphere.[3] The growth mechanism is further modified to produce films of WTe_2 and lesser studied $PtTe_2$.
The $MoTe_2$ films demonstrate promising electrocatalytic results for the hydrogen evolution reaction with competitive Tafel slopes below 70 mV dec^{-1}. The $PtTe_2$ films are investigated as a catalyst for oxygen reduction. While the morphology of the WTe_2 films result in interesting single-crystalline flakes which are isolated and examined electrically.

Figures

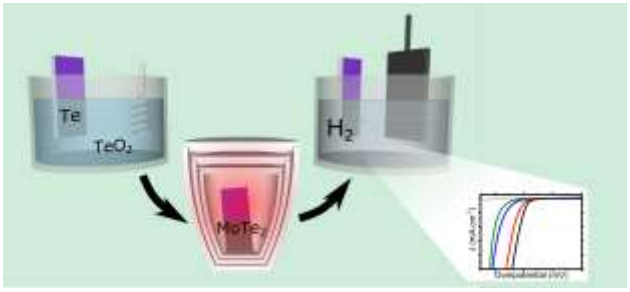

Figure 1: Outline of fabrication and measurement process for 1T' $MoTe_2$ electrocatalytic films

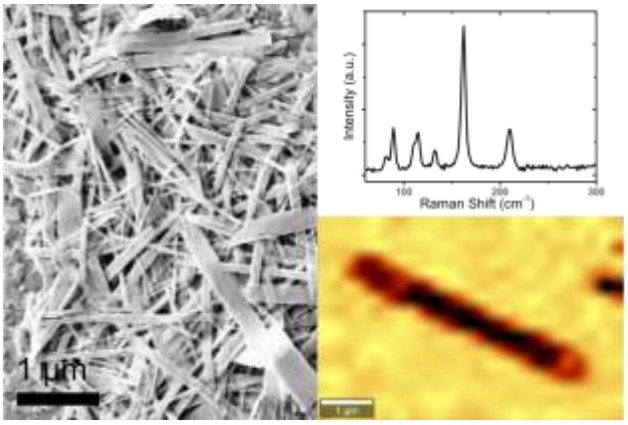

Figure 2: SEM image of WTe_2 film, Raman spectra and intensity map (A_2 peak at 162cm^{-1}) of transferred single crystal WTe_2 flake

References

[1] Duerloo et al., Nat. Comm., 5 (2014)
[2] Song et al., Adv. Sci., 3 (2019)
[3] Mc Manus et al. Appl. Energy Mater, 2 (2019) 521