

Supporting Information

Patterned films from exfoliated two-dimensional transition metal dichalcogenides assembled at a liquid-liquid interface

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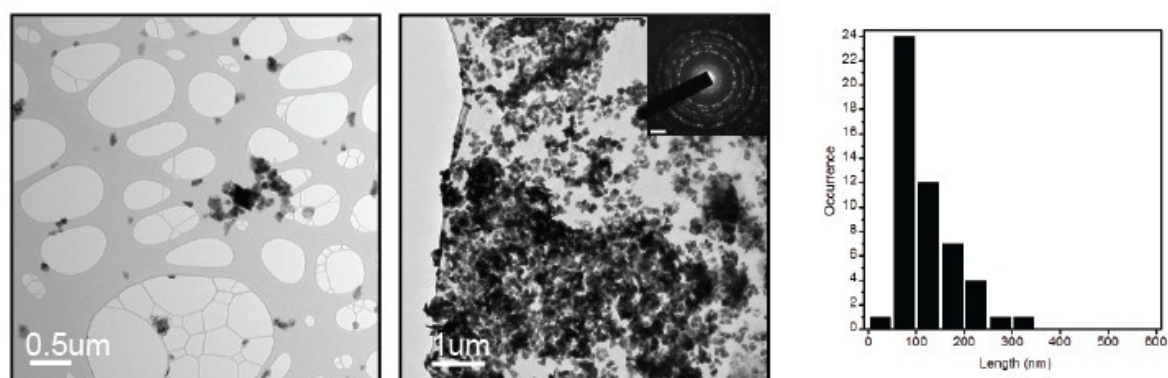


Figure S1: TEM of ReS₂ suspension and assembled film, showing agglomeration.

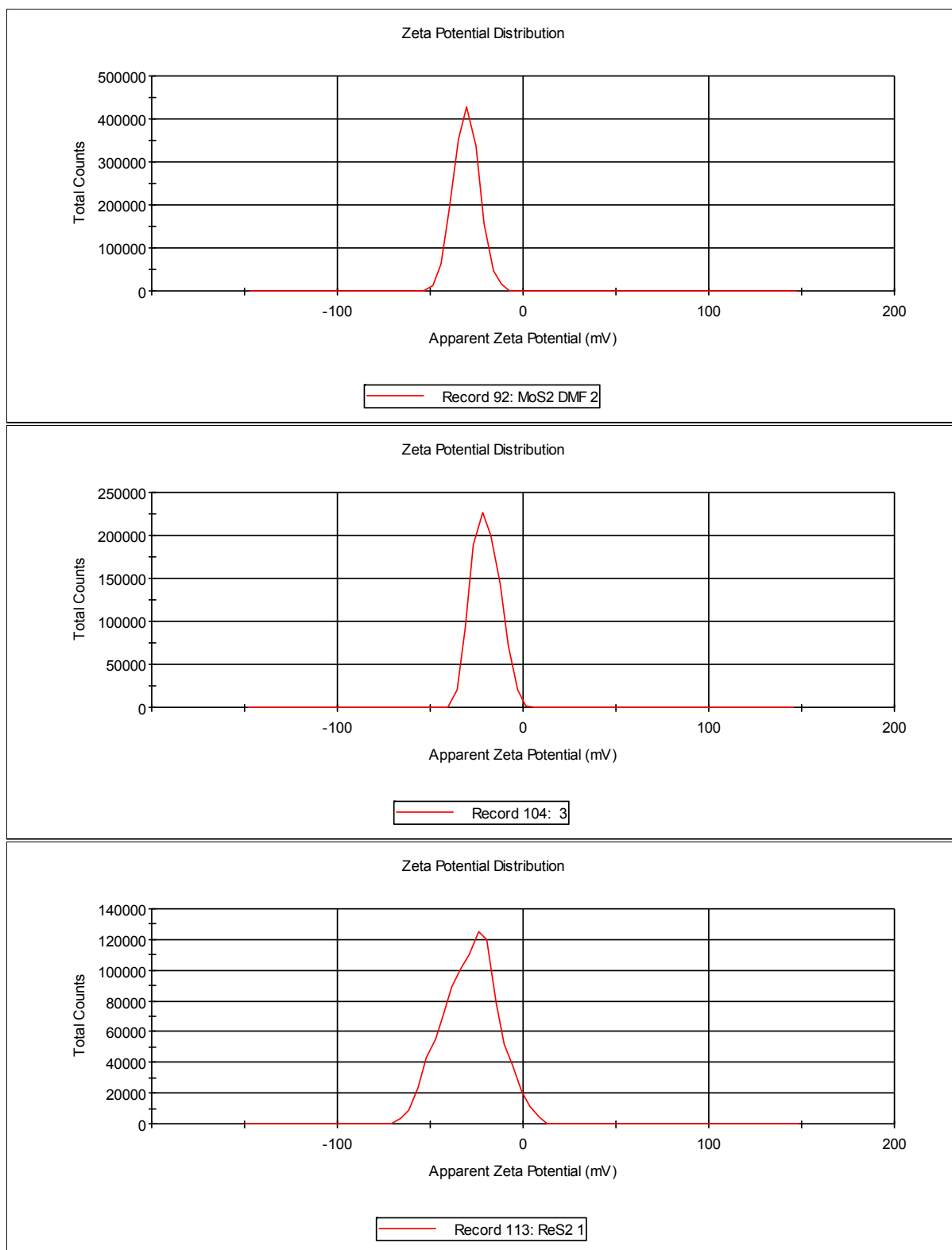
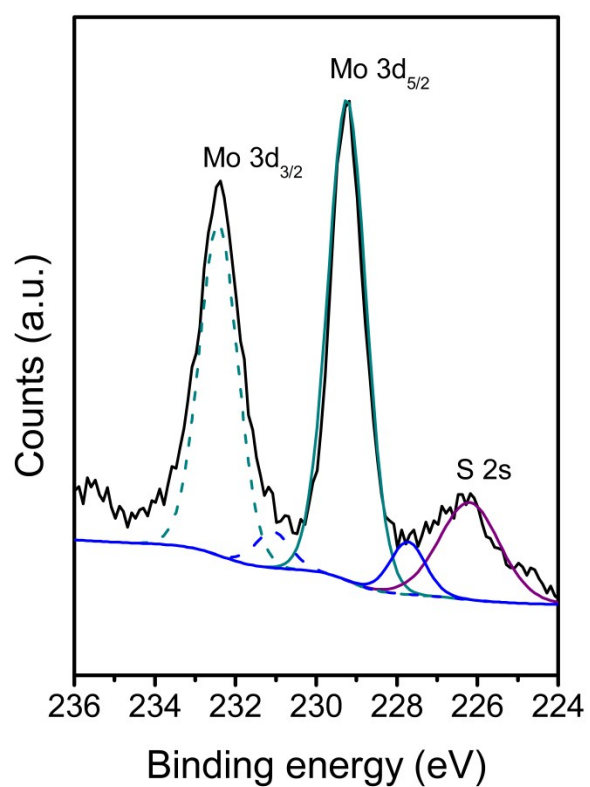


Figure S2: Zeta potential measurements for MoS₂, WS₂ and ReS₂ suspended in DMF.

a



b

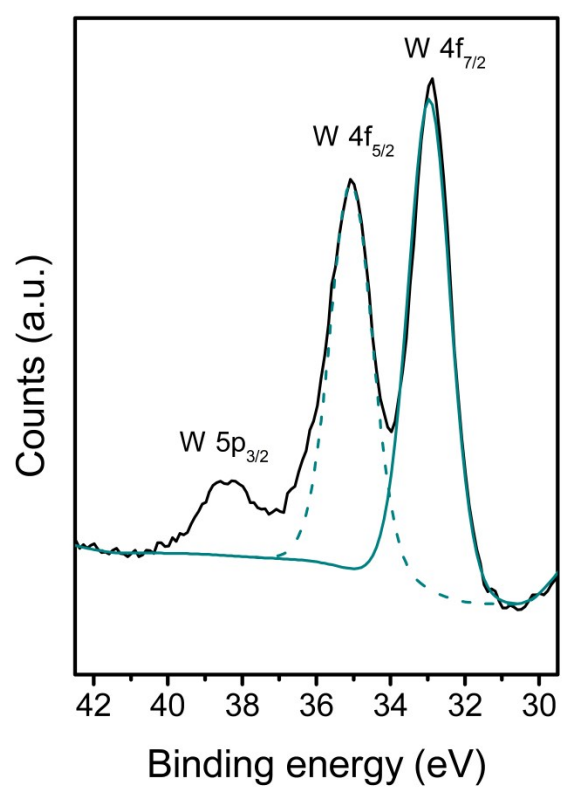


Figure S3: XPS traces of a) Mo 3d energy window for MoS₂ and b) W 4f energy window for WS₂. The native 2H phase is shown in green and the 1T phase is shown in blue for MoS₂.

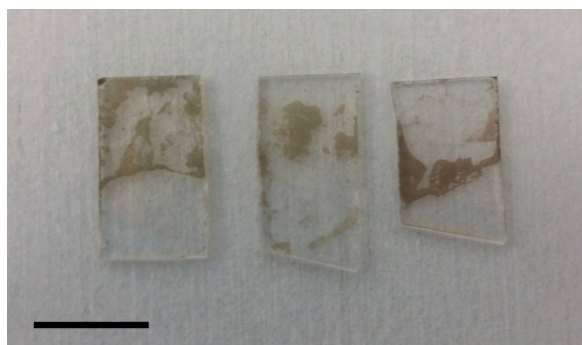
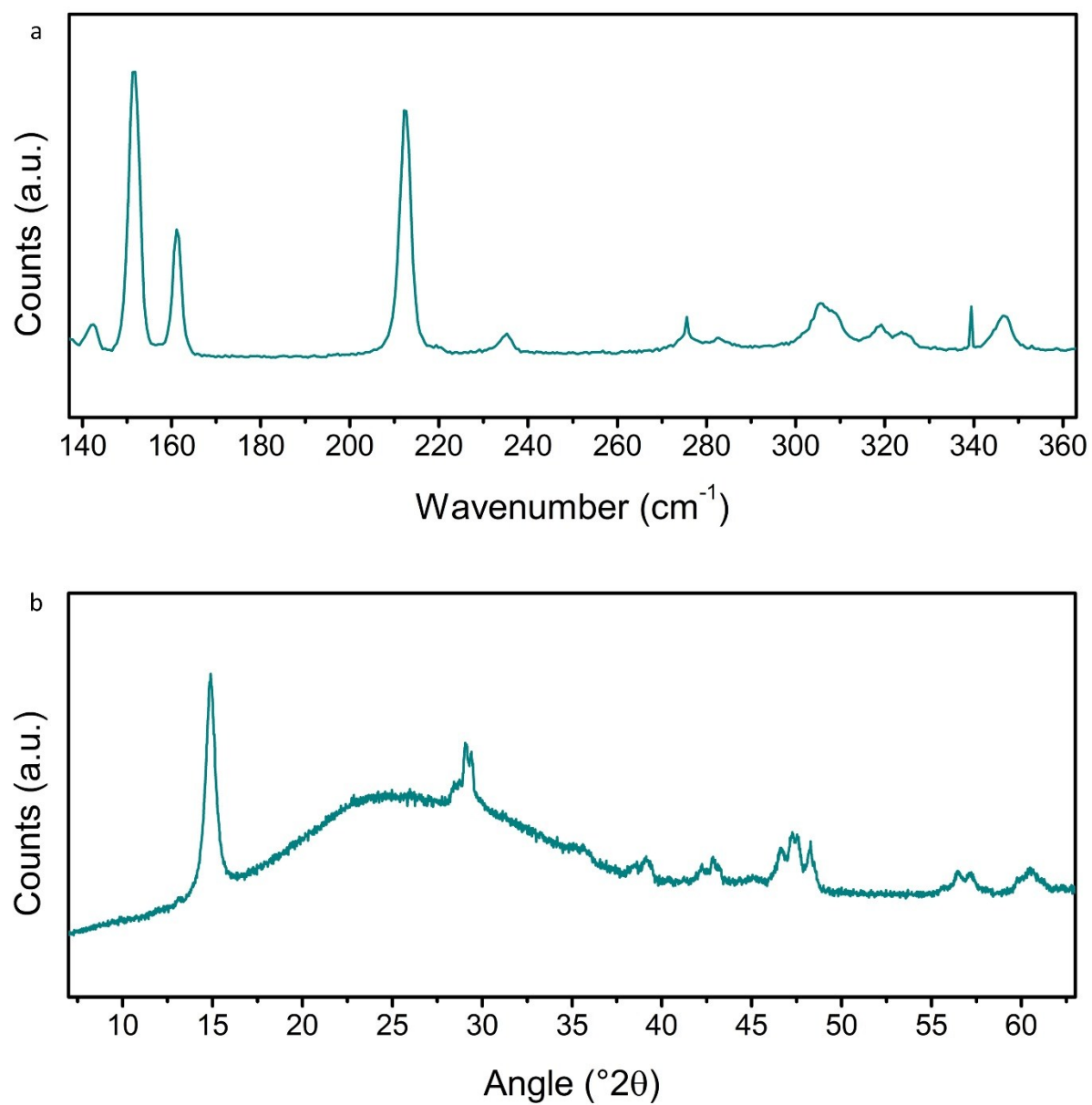


Figure S4: a) Raman spectrum of exfoliated ReS₂. b) XRD pattern of exfoliated ReS₂ and photo of free-formed films of MoS₂, WS₂ and ReS₂ on glass for XRD analysis, scale bar 1 cm.

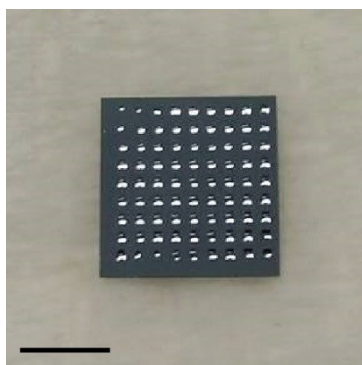


Figure S5: Photo of an example of a hydrophobic patterned substrate wet with water, scale bar 5 mm.

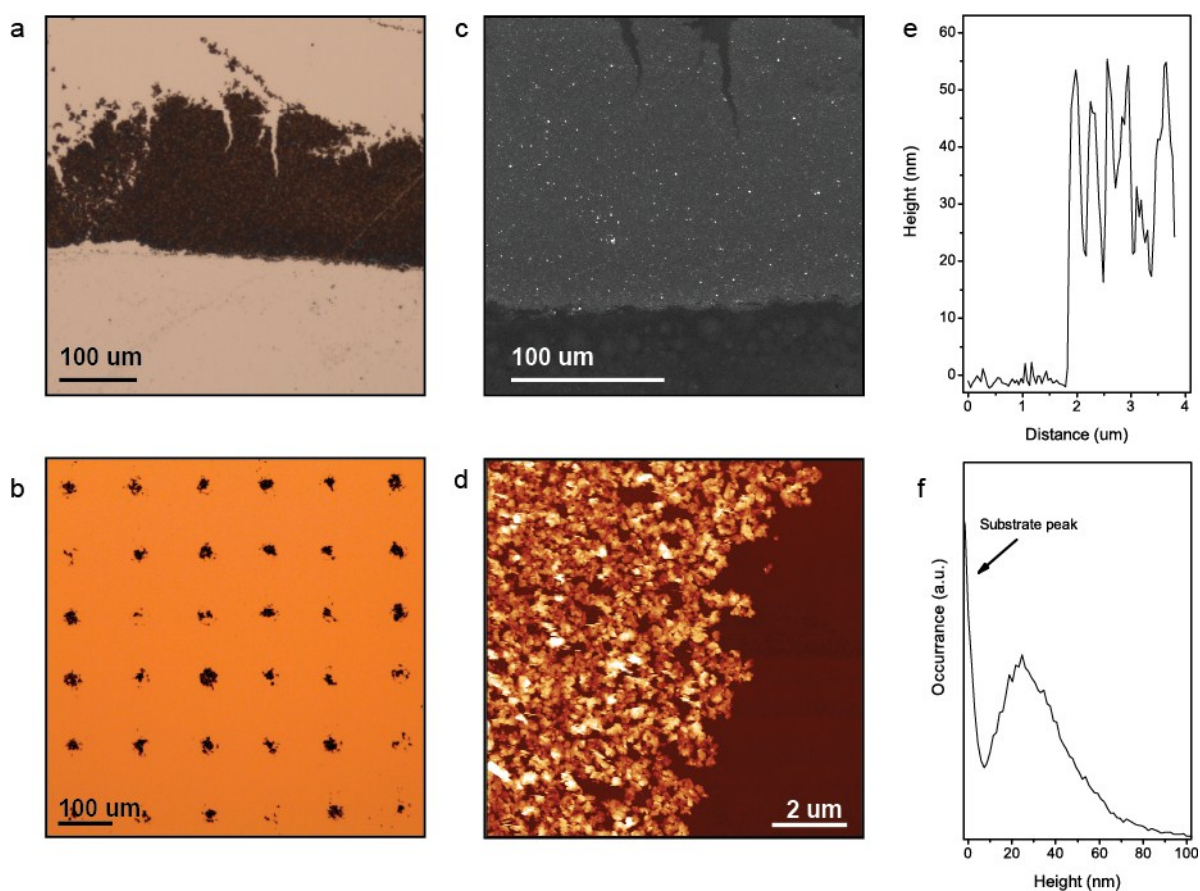


Figure S6: ReS_2 patterned films that don't follow the hydrophobic patterning well. A) optical image of horizontal patterned film, b) optical of spot patterned film, c) SEM image of same area as a), d) AFM image, e) AFM profile and f) AFM height statistics. The thickness of the film is much higher and has a wider height distribution than for MoS_2 and WS_2 films because of particle agglomeration.

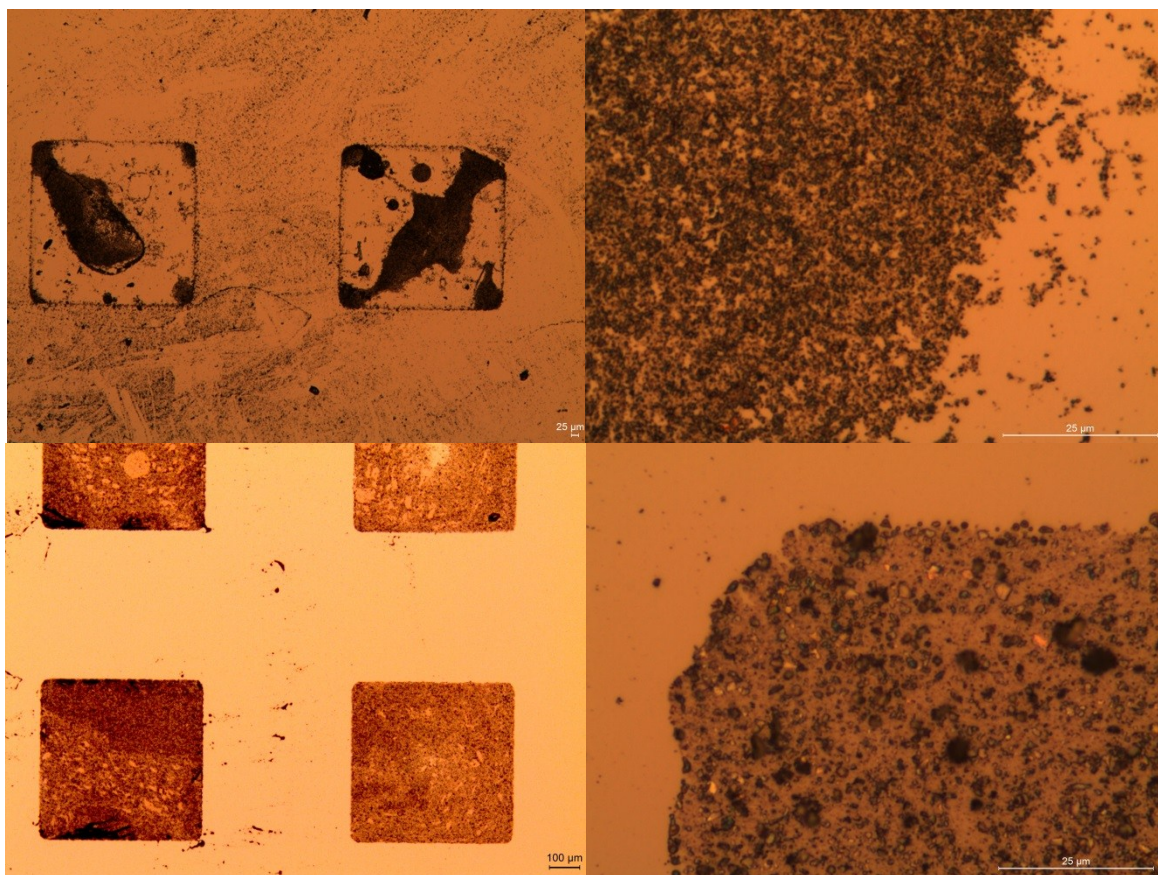


Figure S7: Example of the same patterned ReS_2 (top) and MoS_2 (bottom) film, showing MoS_2 forms a much larger, more uniform film.

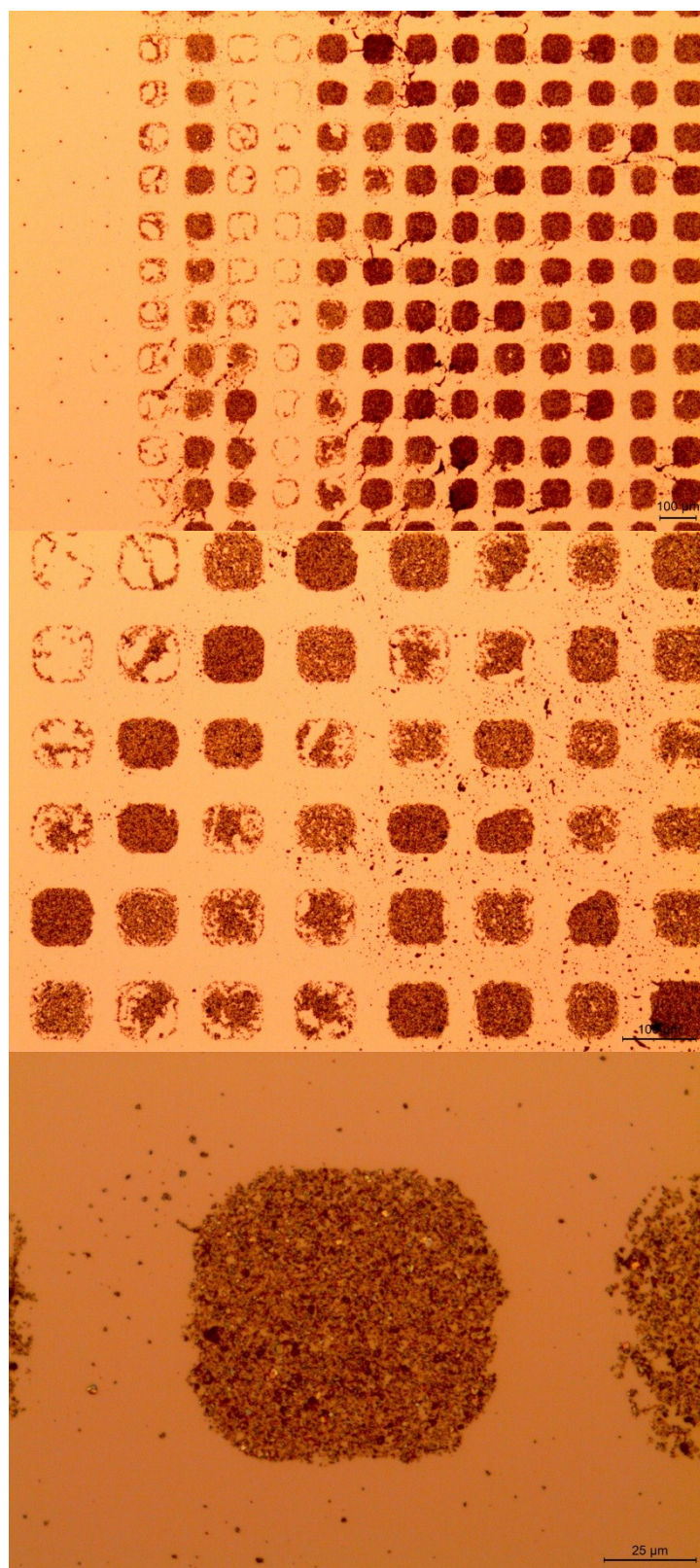
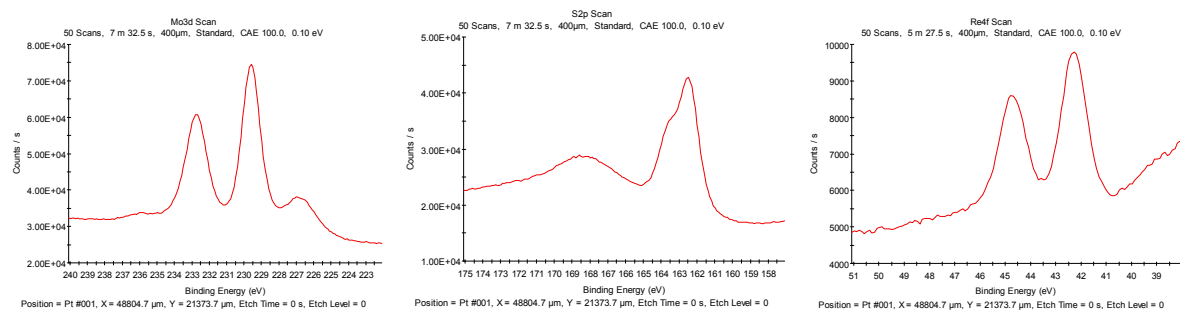
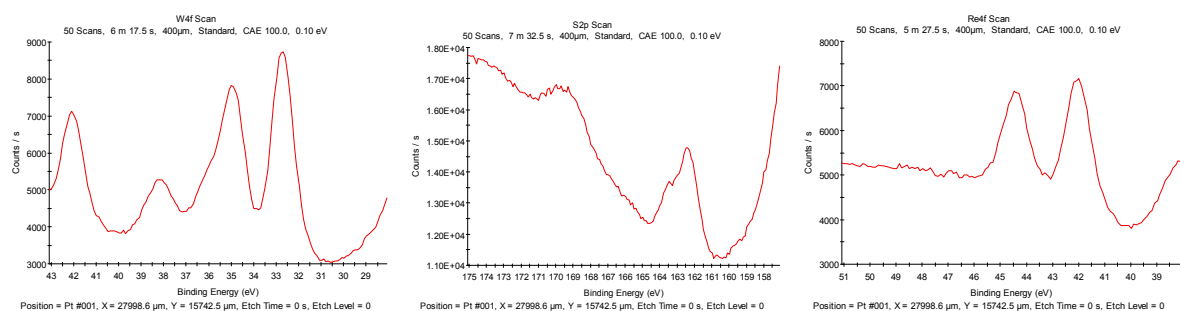


Figure S8: Patterned WS₂ film showing difficulty in long range deposition consistency. Dip-coating by hand could be improved by introduction of a robotic process.

a



b



c

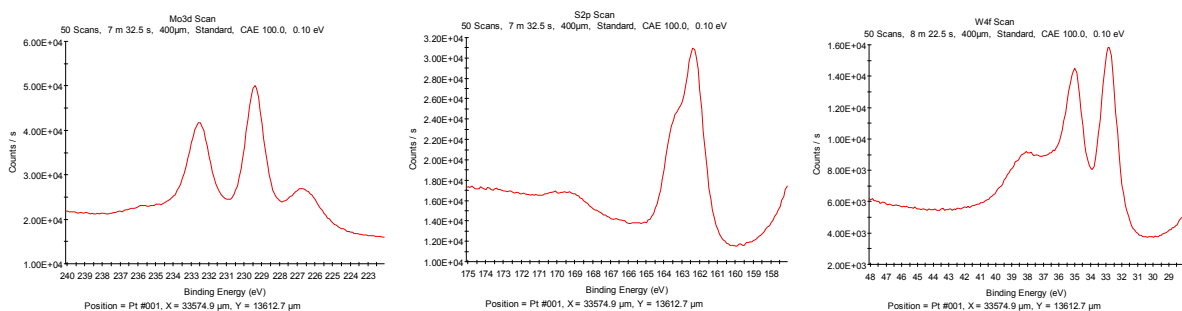


Figure S9: XPS of composite films. a) $\text{MoS}_2\text{-ReS}_2$, b) $\text{WS}_2\text{-ReS}_2$ and c) $\text{MoS}_2\text{-WS}_2$.