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# Liquid phase exfoliation of $MoO_2$ nanosheets for lithium ion battery applications

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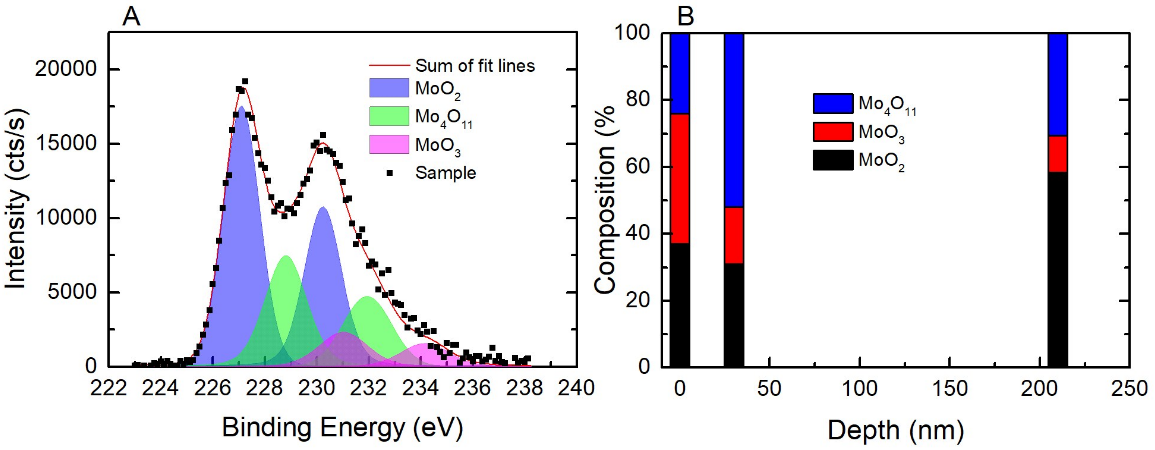

*Figure 1: XPS analysis of $MoO_2$ films made by vacuum filtration. A shows the measured XPS spectrum of the sample and its fitted components. The sum of these fits is also shown for comparison with the observed spectrum. B indicates the variance of composition with sputtering depth.*

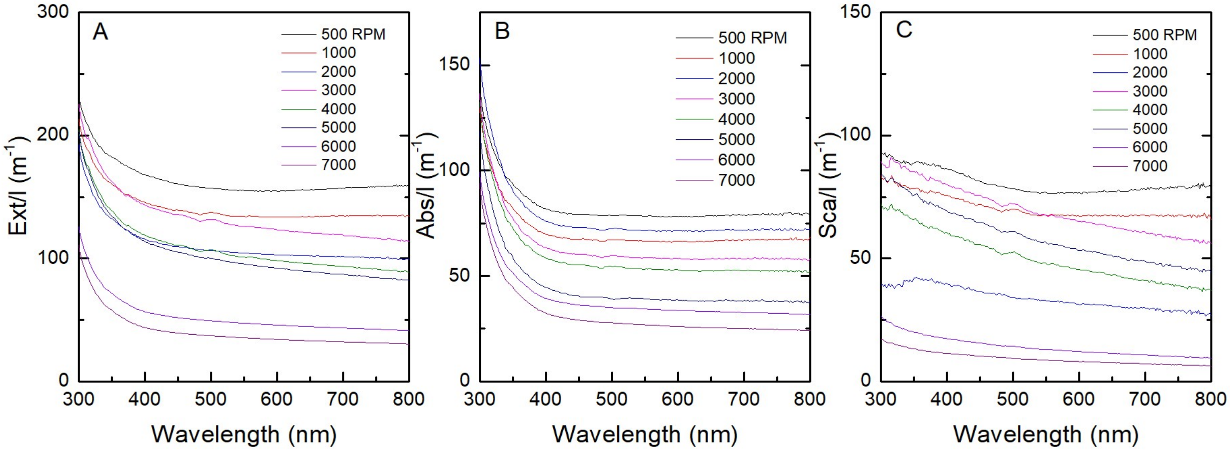

*Figure 2: Centrifugation study of $MoO_2$ in CHP. A-C show the Extinction, Absorption and Scattering spectra respectively from UV-vis spectroscopic analysis.*

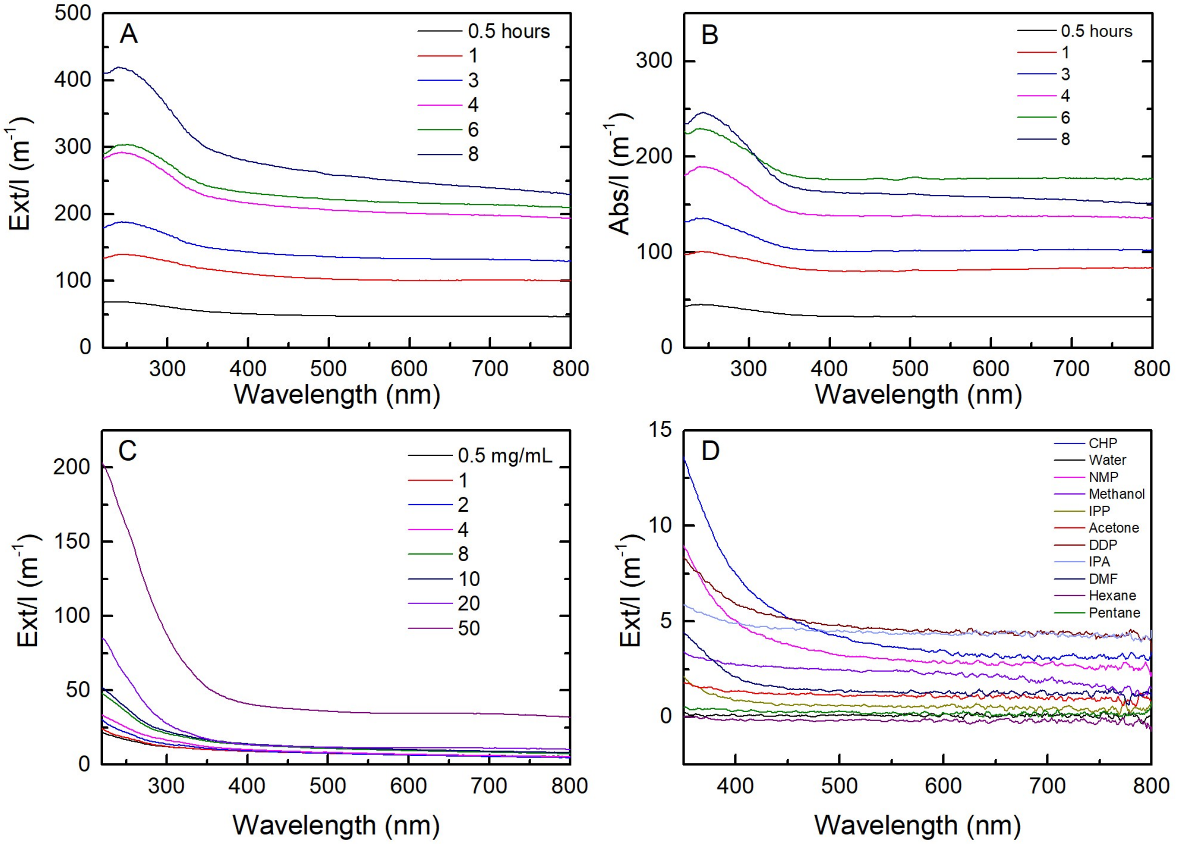

*Figure 3: Optimization of the exfoliation process. A-B show UV vis spectra for a study on variation in sonication time, where A and B are the extinction and absorption respectively. C Initial concentration study, D Solvent study.*

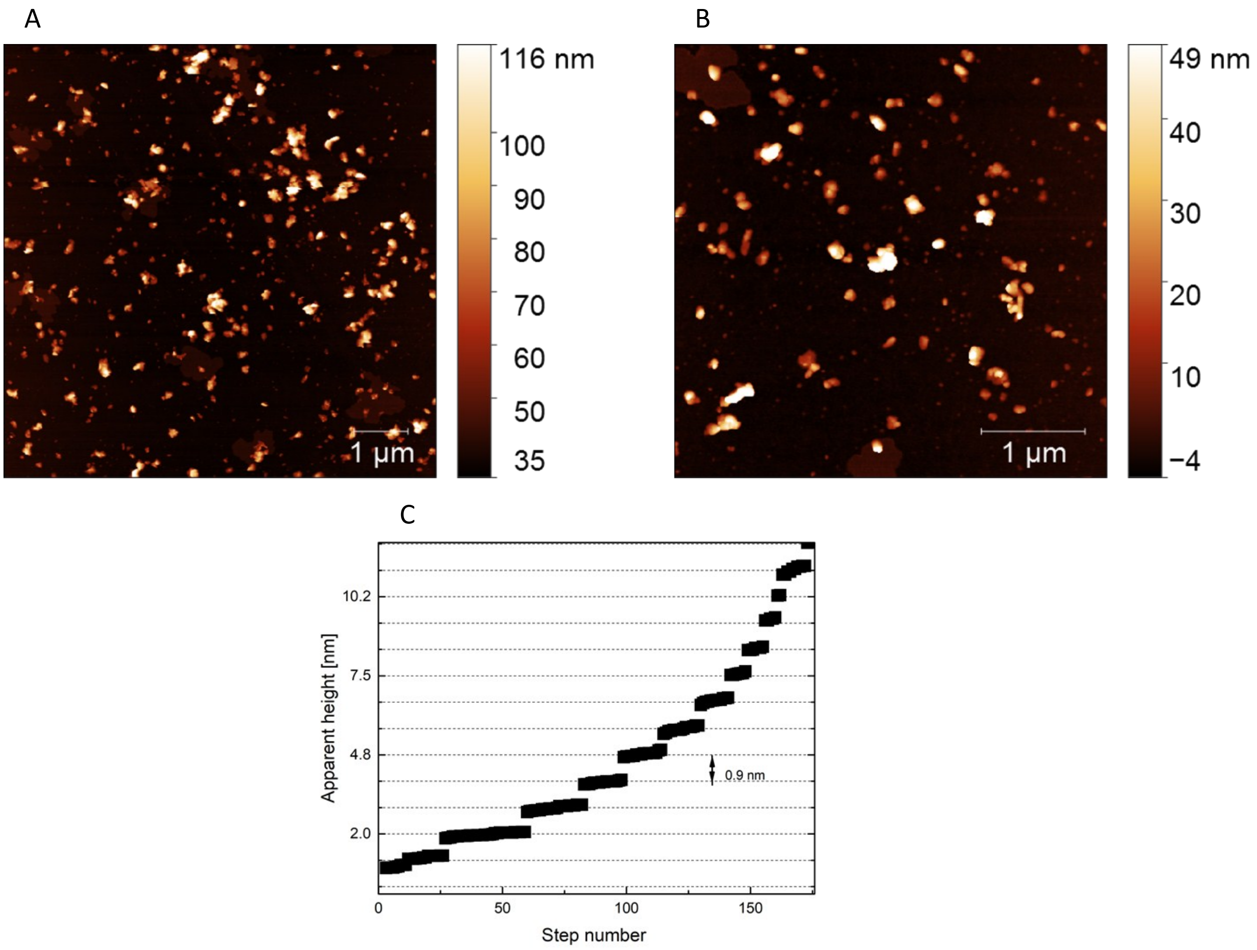

*Figure 4: AFM analysis of $MoO_2$ standard sample in IPA. A and B are representative AFM images. C is the step height analysis.*

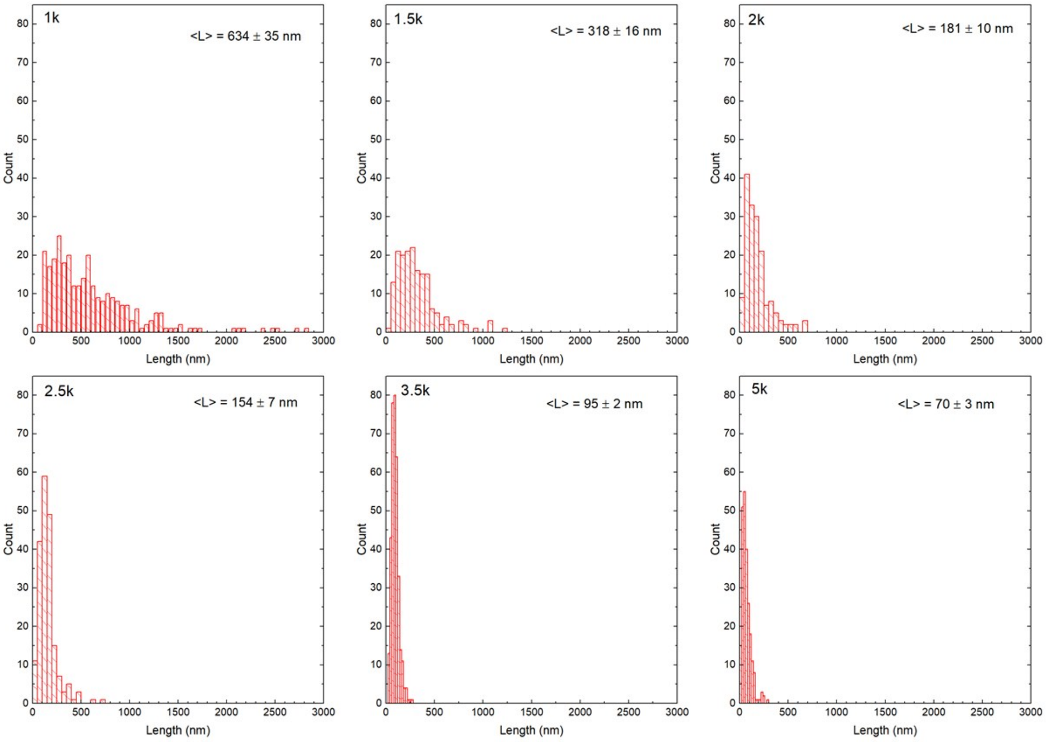

*Figure 5: Flake size distribution of size selected samples from TEM analysis.*

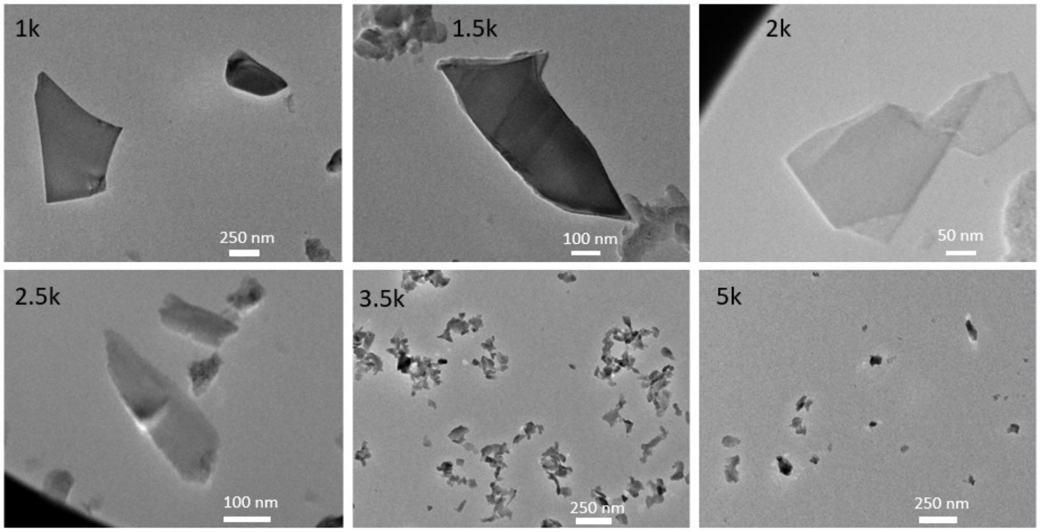

*Figure 6: Representative TEM images from size selected samples.*

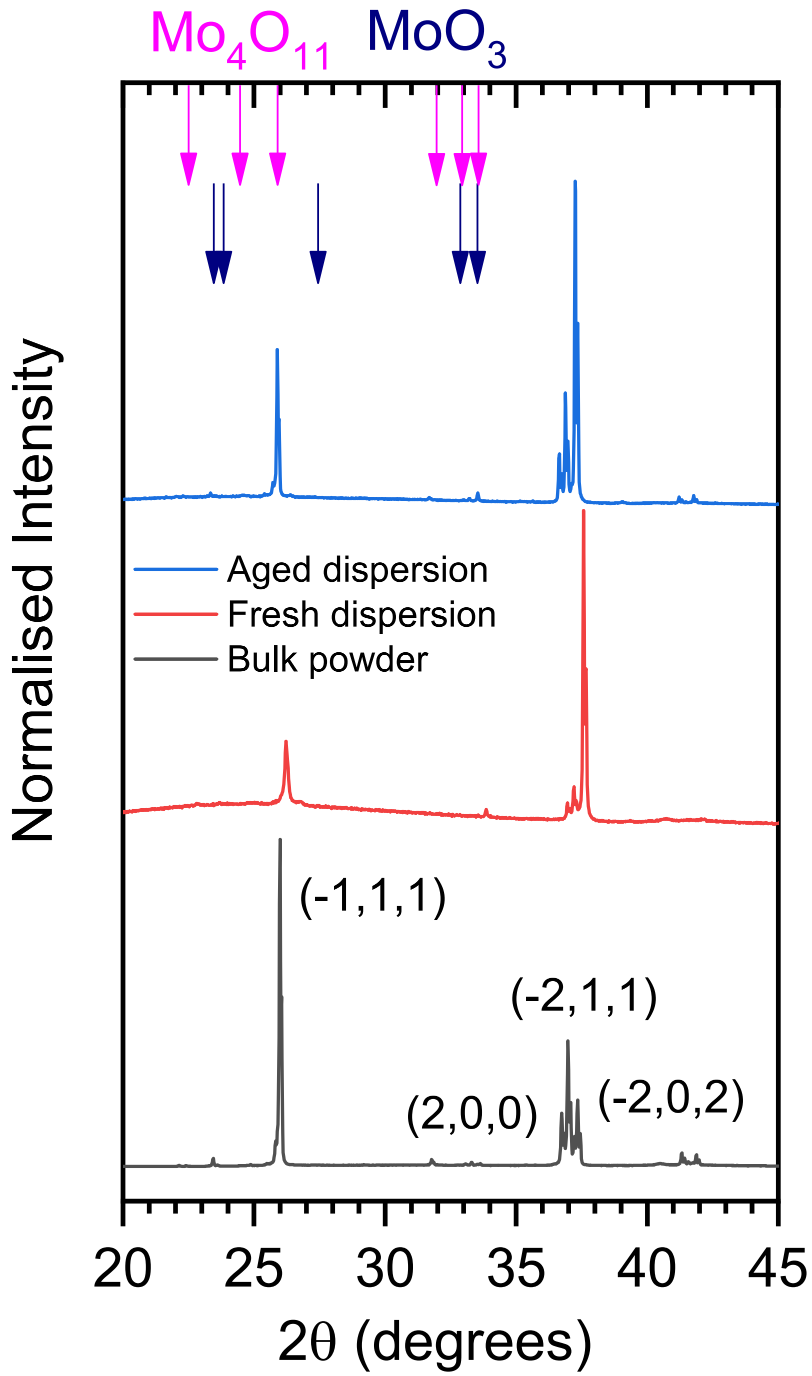

*Figure 7: X-ray diffraction spectra for bulk $MoO_2$ powder (black) as well as $MoO_2$ nanosheets cast into a film from a fresh dispersion (red) and $MoO_2$ nanosheets cast into a film from an aged dispersion (blue).The aged dispersion was stored in IPA for 2 months before testing. The magenta and navy arrows at the top represent the positions of the main lines for $Mo_4O_{11}$ and $MoO_3$ as reported by ref*[1].

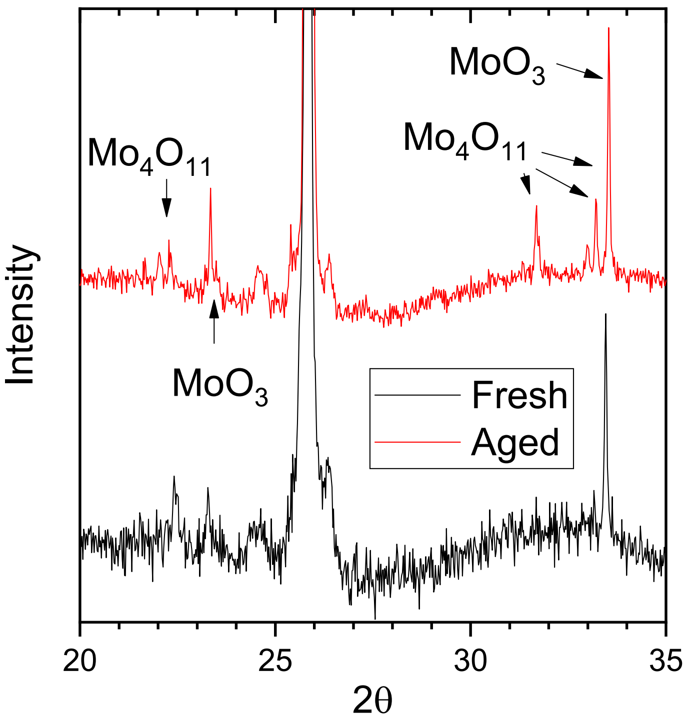

*Figure 8: Comparison of weak peaks in fresh and aged nanosheet spectra. Weak MoO3 and Mo4O11 peaks can be seen, predominately in the aged sample.*

*X-Ray diffraction (XRD) measurements were performed in a Bruker Advance Powder X-Ray diffractometer equipped with Cu-Kα emission source in Bragg-Brentano configuration. Bulk MoO2 finely ground powder was directly deposited in a sample holder, while for the nanosheet dispersions, the measurements were done on thin films prepared on glass substrates.*

1. T. Ressler, R. E. Jentoft, J. Wienold, M. M. Günter and O. Timpe, *The Journal of Physical Chemistry B*, 2000, **104**, 6360-6370.