Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Information

Rapid Dry Exfoliation Method for Tunable Production of Molybdenum Disulphide Quantum Dots and Large Micron-Dimension Sheets

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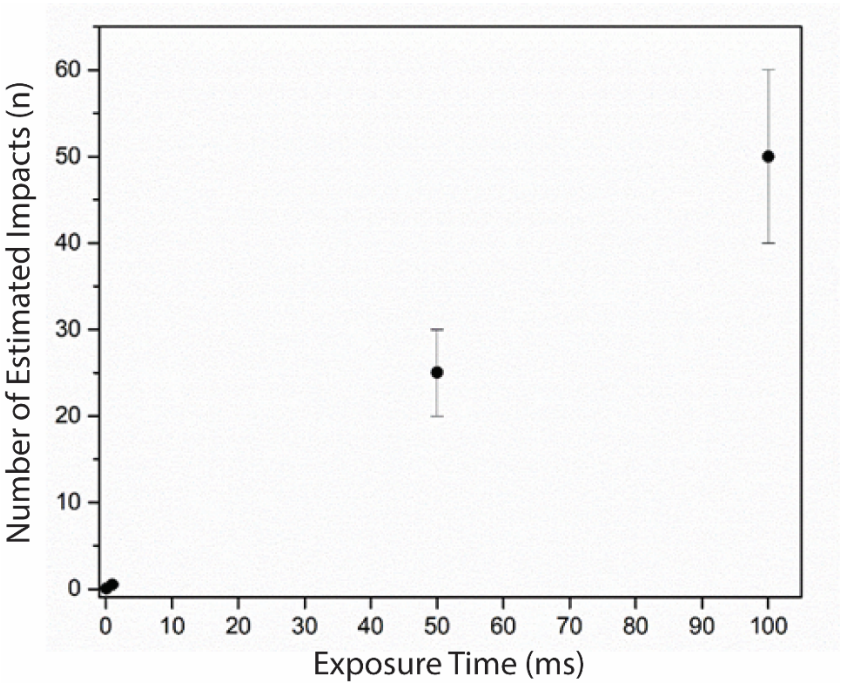
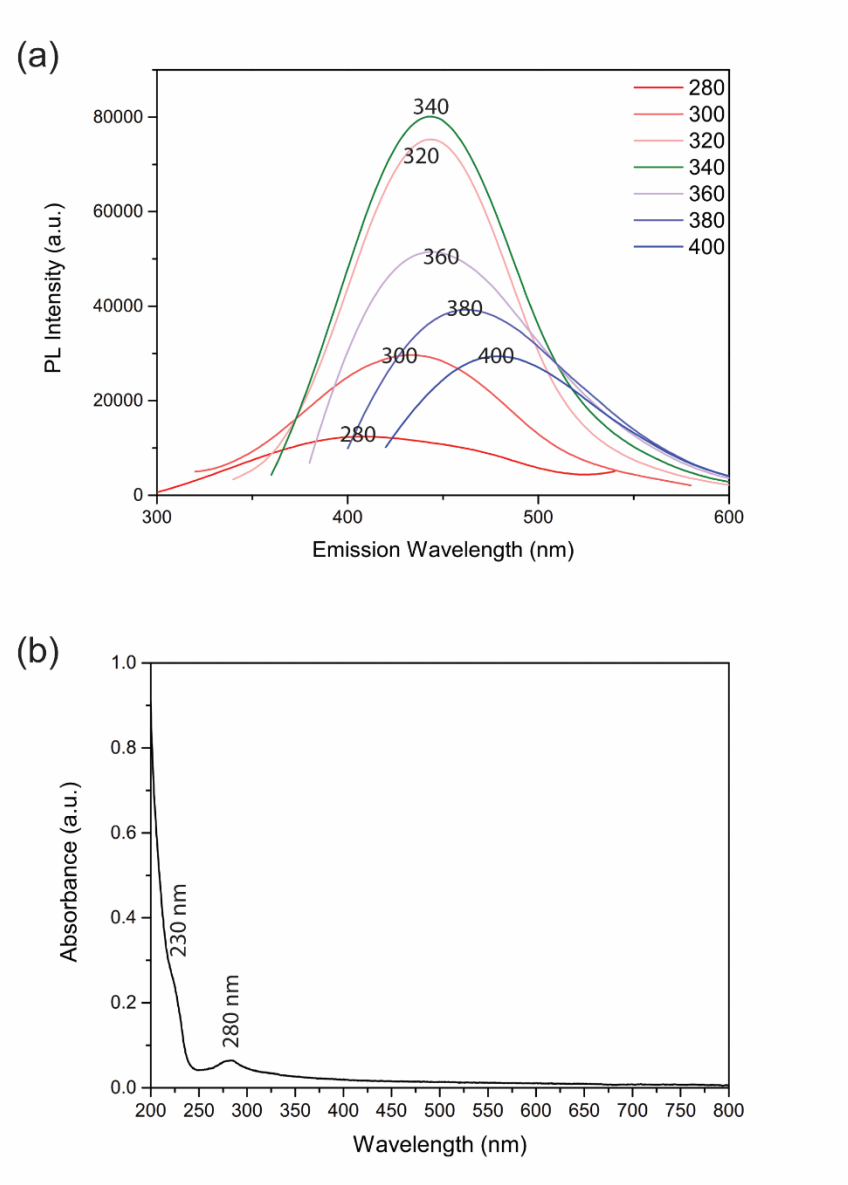
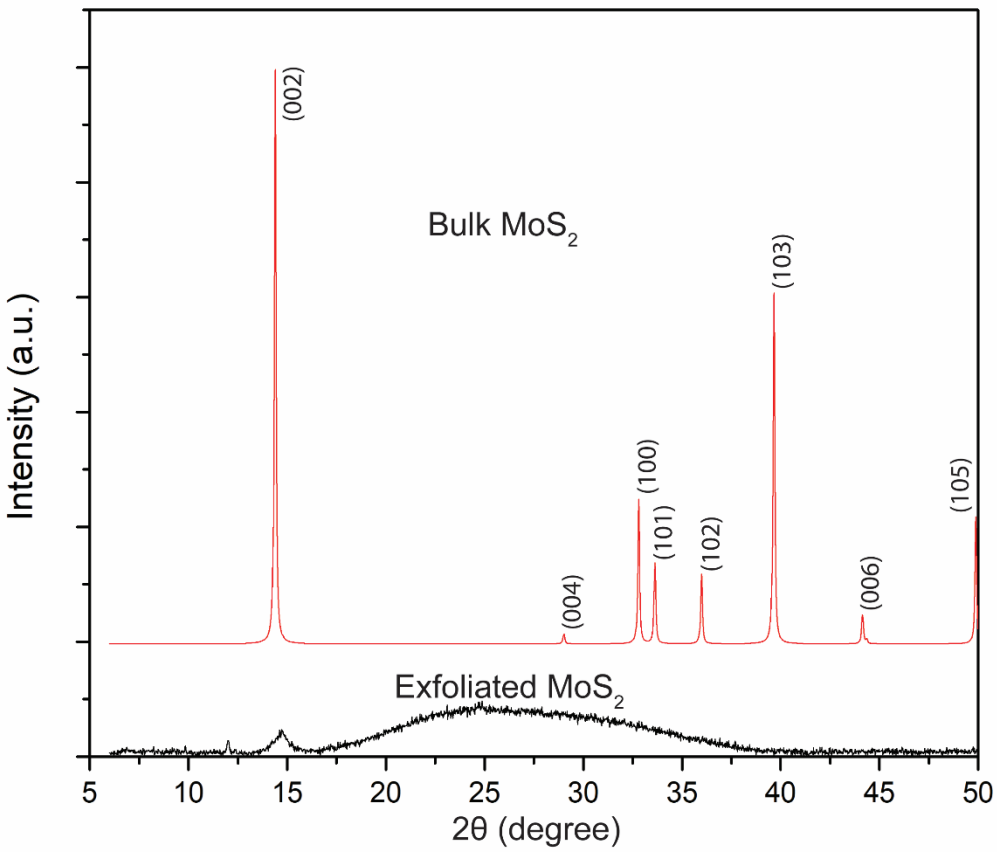


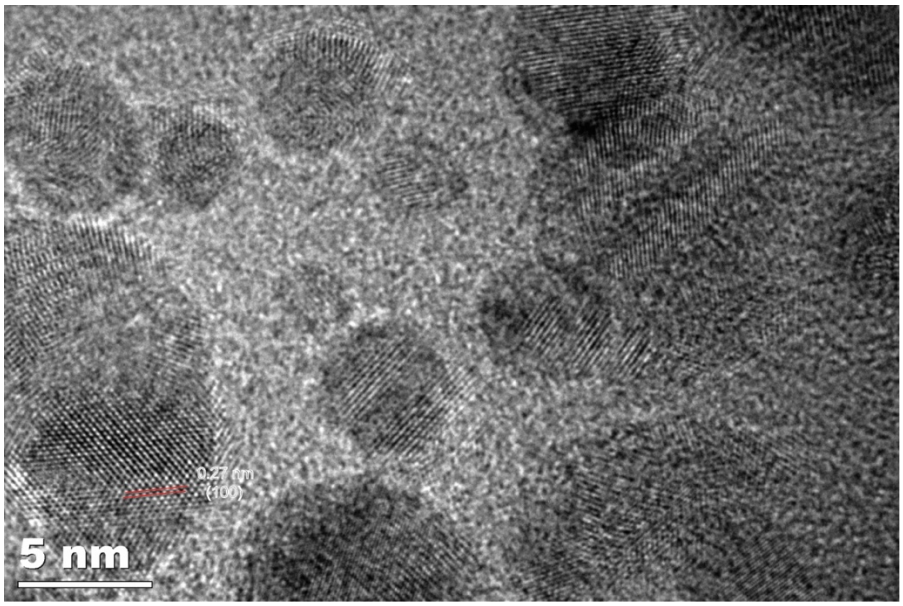
Supplementary Fig. 1: Typical particle cluster speeds upon impact, estimated from high speed videography, showing an average speed of 0.5 m/s.



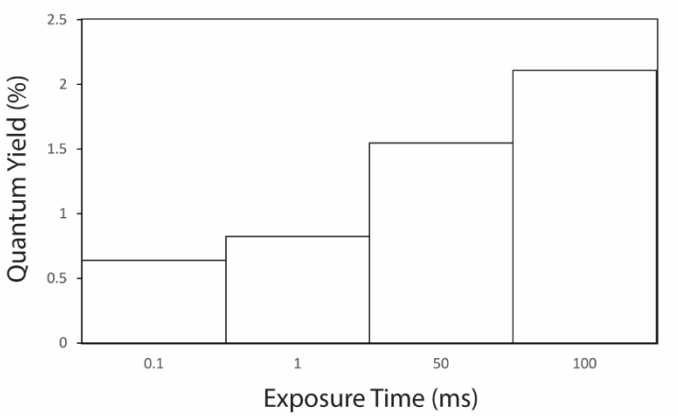
Supplementary Fig. 2: (a) PL spectrum of a dispersion of MoS_2 QDs irradiated at increasing wavelengths, in which a characteristic shift in the emission maxima is observed, thus indicating their polydispersed nature. (b) Absorbance spectrum of the MoS_2 QDs, showing characteristic peaks at 230 nm and 280 nm.



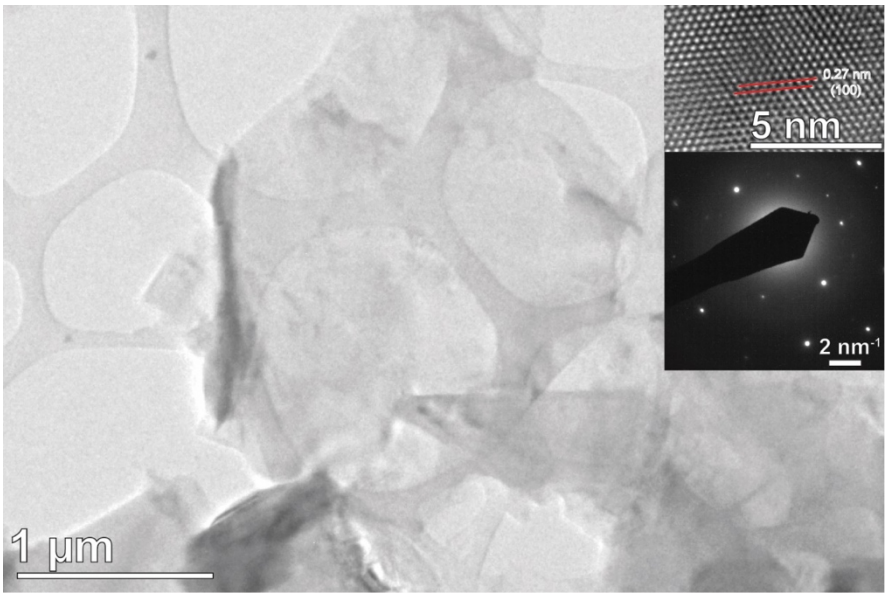
Supplementary Fig. 3: Powder XRD spectra of the exfoliated MoS_2 QDs in comparison to bulk MoS_2 on a glass substrate.



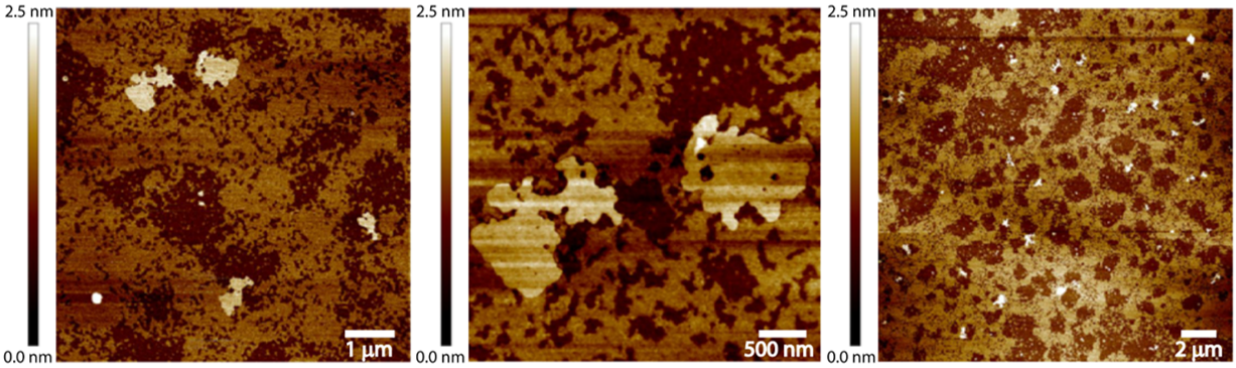
Supplementary Fig. 4: HR-TEM image of the MoS_2 QDs obtained, showing the characteristic 0.27 nm interlayer spacing of MoS_2 corresponding to the (100) lattice plane.



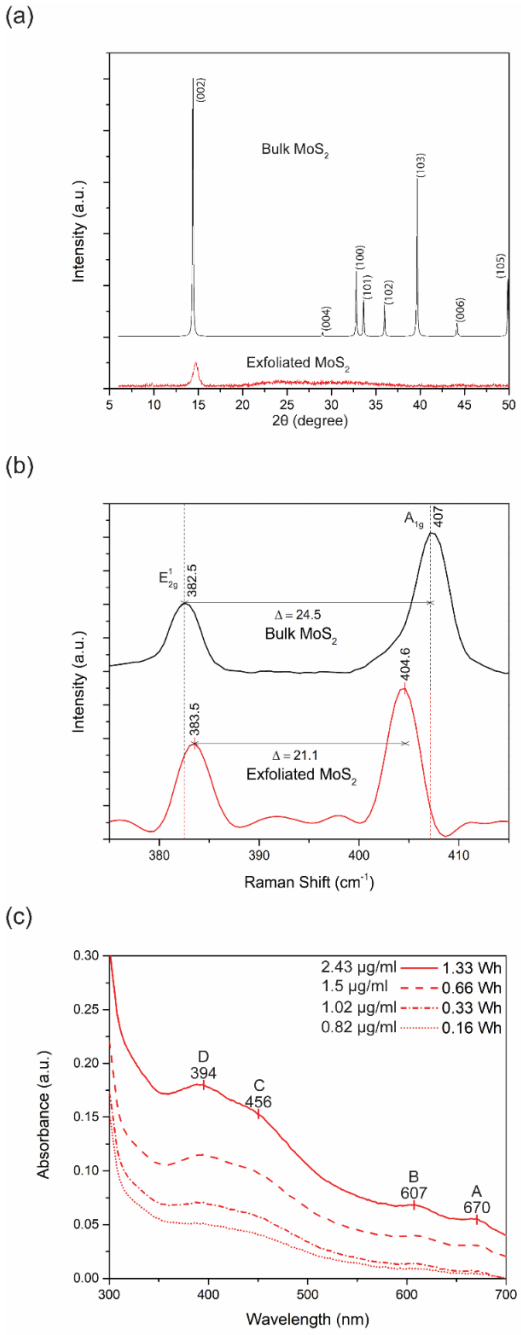
Supplementary Fig. 5: Increasing quantum yield, as calculated from the spectrofluorometric data, with increases in the SAW exposure time.



Supplementary Fig. 6: HR-TEM image of the large MoS_2 sheets that are produced. The insets show the characteristic 0.27 nm interlayer spacing of MoS_2 associated with the (100) plane together with the corresponding diffraction pattern.



Supplementary Fig. 7: Representative AFM sample scans showing the large MoS_2 sheets obtained with the zero-limit height configuration.



Supplementary Fig. 8: (a) XRD and (b) Raman spectra of the exfoliated sheets in comparison to bulk MoS_2, and, (c) UV/Vis absorbance spectra of the former at different SAW energies together with the corresponding exfoliated product concentration (equivalent to a yield of 0.24%, 0.15%,

0.1% and 0.08% of the initial bulk material feedstock). A, B, C and D are the excitonic peaks, which can be seen to increase in intensity with increasing SAW exposure.