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 polydisperse 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\textsubscript{2} QDs in comparison to bulk MoS\textsubscript{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\textsubscript{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.