

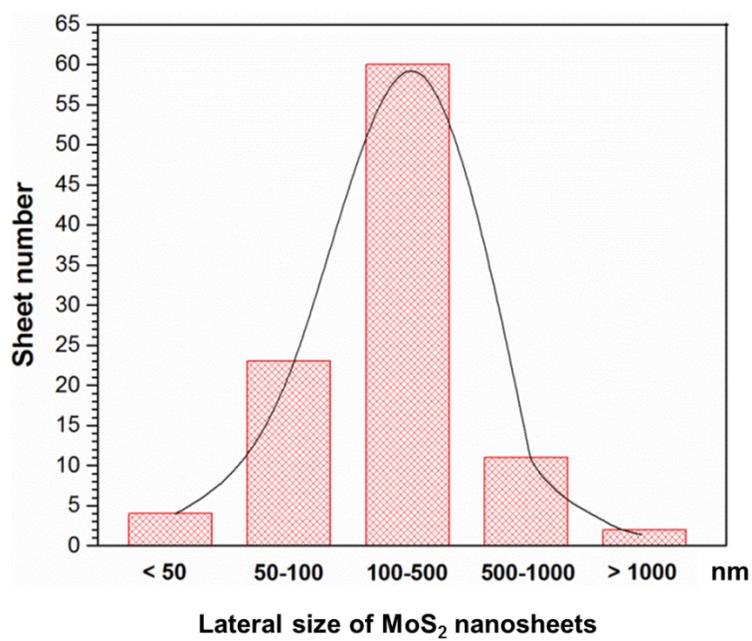
# Lignin-assisted exfoliation of molybdenum disulfide in aqueous media and its application in lithium ion batteries

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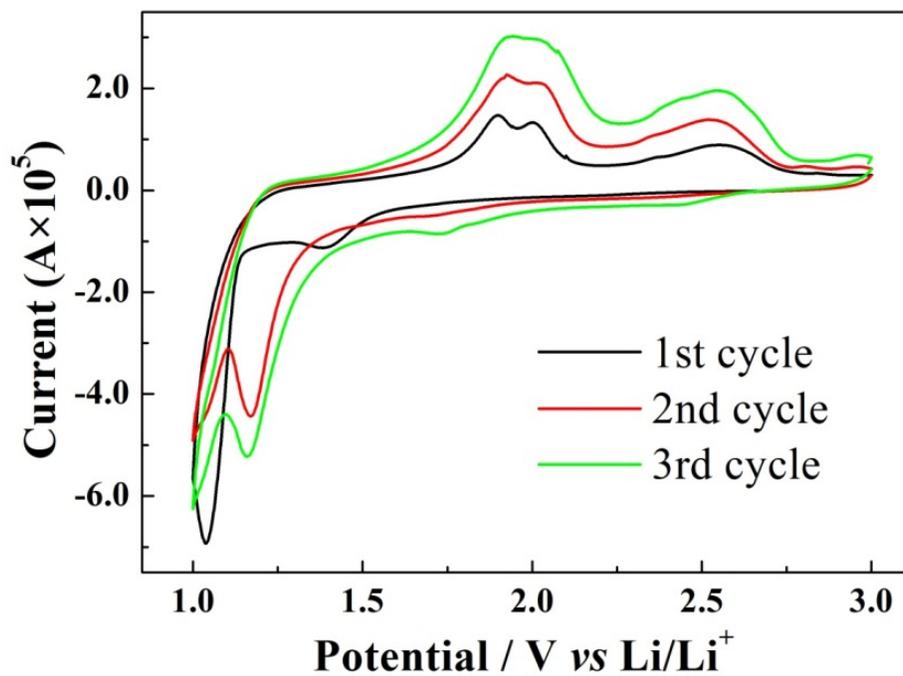
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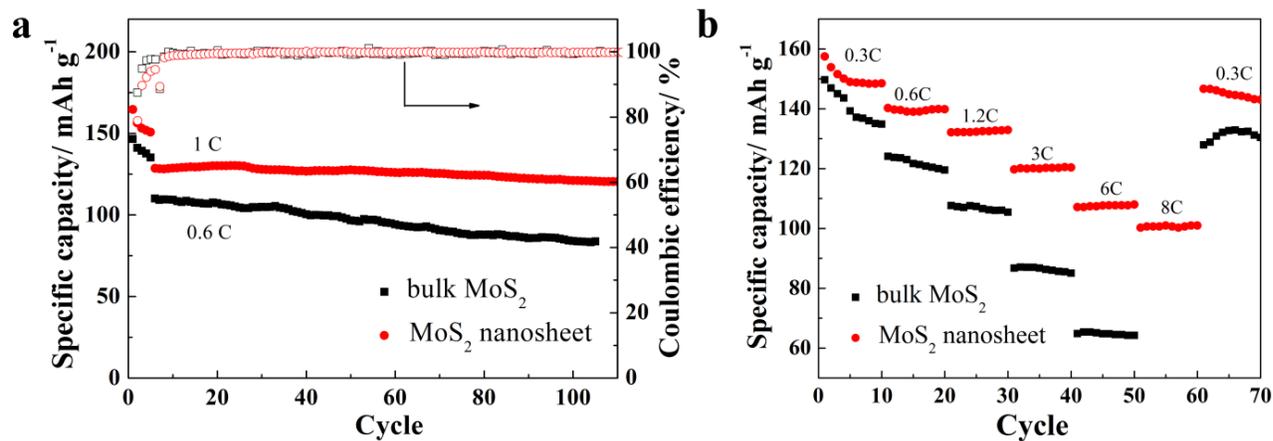
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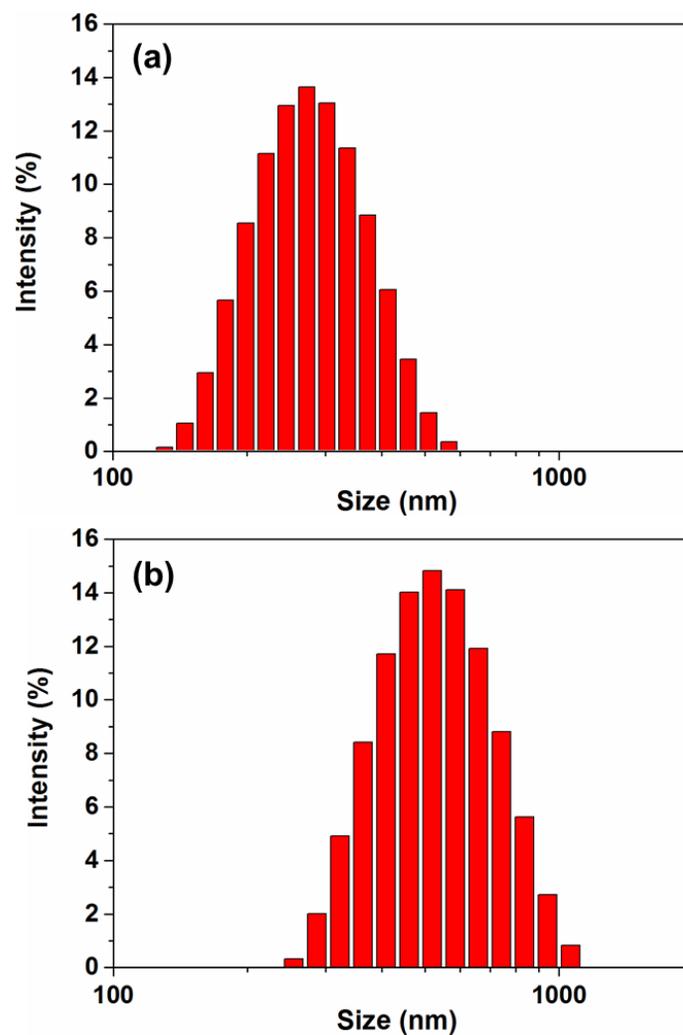
**Fig. S1.** The histograms of lateral size distribution of exfoliated MoS<sub>2</sub> nanosheets.



**Fig. S2.** Cyclic voltammograms of Bulk MoS<sub>2</sub> between 1 and 3 V at a scan rate of 0.05 mV/s.



**Fig. S3.** (a) Cycling stability and (b) Rate capabilities of the exfoliated MoS<sub>2</sub> nanosheets between 1-3V vs Li/Li<sup>+</sup> with a carbon black content of 10 wt%.



**Fig. S4.** The histograms of hydrodynamic size distributions of the exfoliated (a) WS<sub>2</sub> and (b) BN nanosheets.

Table S1 Referenced table of exfoliation of MoS<sub>2</sub> in aqueous media

Surfactant	Exfoliation method	Concentration	Ref
Sodium cholate	Probe sonication for 16 h; Concentration of surfactant: 1.5 mg mL <sup>-1</sup> ; Concentration of bulk MoS <sub>2</sub> : 5.0 mg mL <sup>-1</sup> ; Purification: centrifugation at 1500 rpm for 90 min.	~ 0.5 mg mL <sup>-1</sup>	1
Chitosan	Gridding bulk MoS <sub>2</sub> followed by oleum treatment; Bath sonication for 40 min followed by probe sonication for 2h; Concentration of surfactant: ~ 0.17 mg mL <sup>-1</sup> ; Purification: centrifugation at 2000 rpm.	~ 1.0 mg mL <sup>-1</sup>	2
Block polymer PEO–PPO–PEO	Sonication (100 W) for 17 h; Purification: centrifugation at 1500 rpm for 5 min.	140 ppm	3
Sodium dodecyl sulfate	Ball milling for 12 h followed by sonication (80W) for 2 h; Concentration of surfactant: 0.5 mg mL <sup>-1</sup> ; Purification: centrifugation at 5000 rpm for 20 min.	0.8 mg mL <sup>-1</sup>	4
No surfactant	Gridding bulk MoS <sub>2</sub> in NMP for 3 h followed by sonication in ethanol/water mixture for 2 h. Purification: centrifugation at 6000 rpm for 30 min	26.7 mg mL <sup>-1</sup>	5
No surfactant	Sonication in ethanol/water mixture for 8 h Purification: centrifugation at 3000 rpm for 20 min	0.018 mg mL <sup>-1</sup>	6

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