

## Electronic Supplementary Information

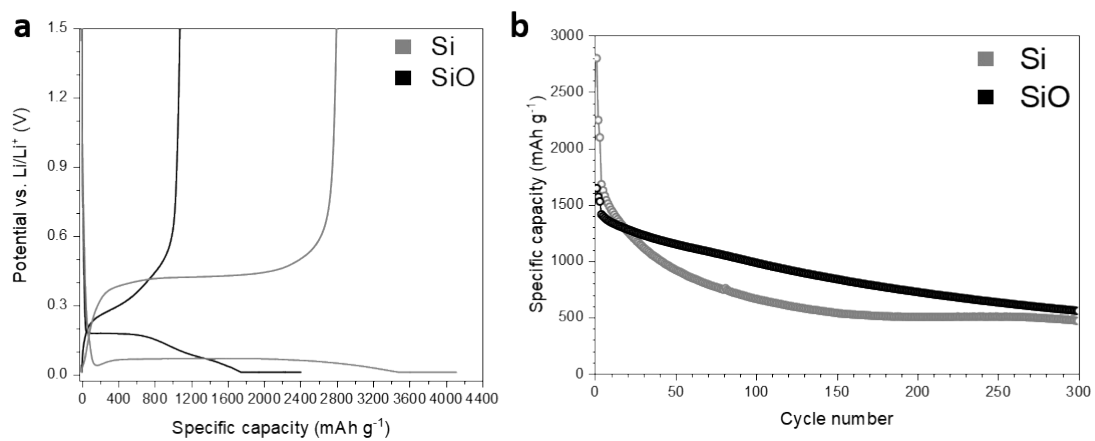
### Lithium and Oxygen Engineered SiO<sub>0.5</sub> Materials for High Performance Lithium Storage Material

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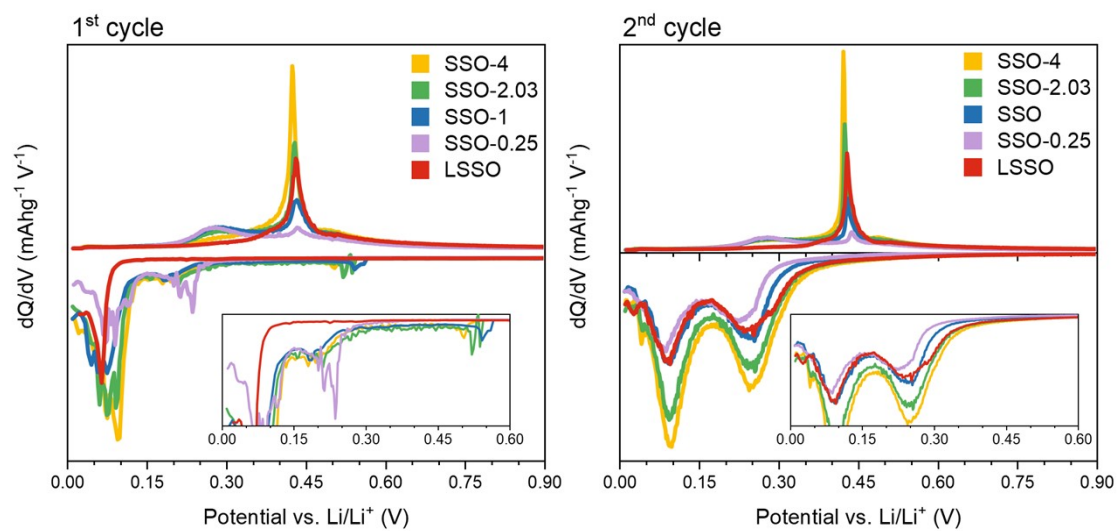
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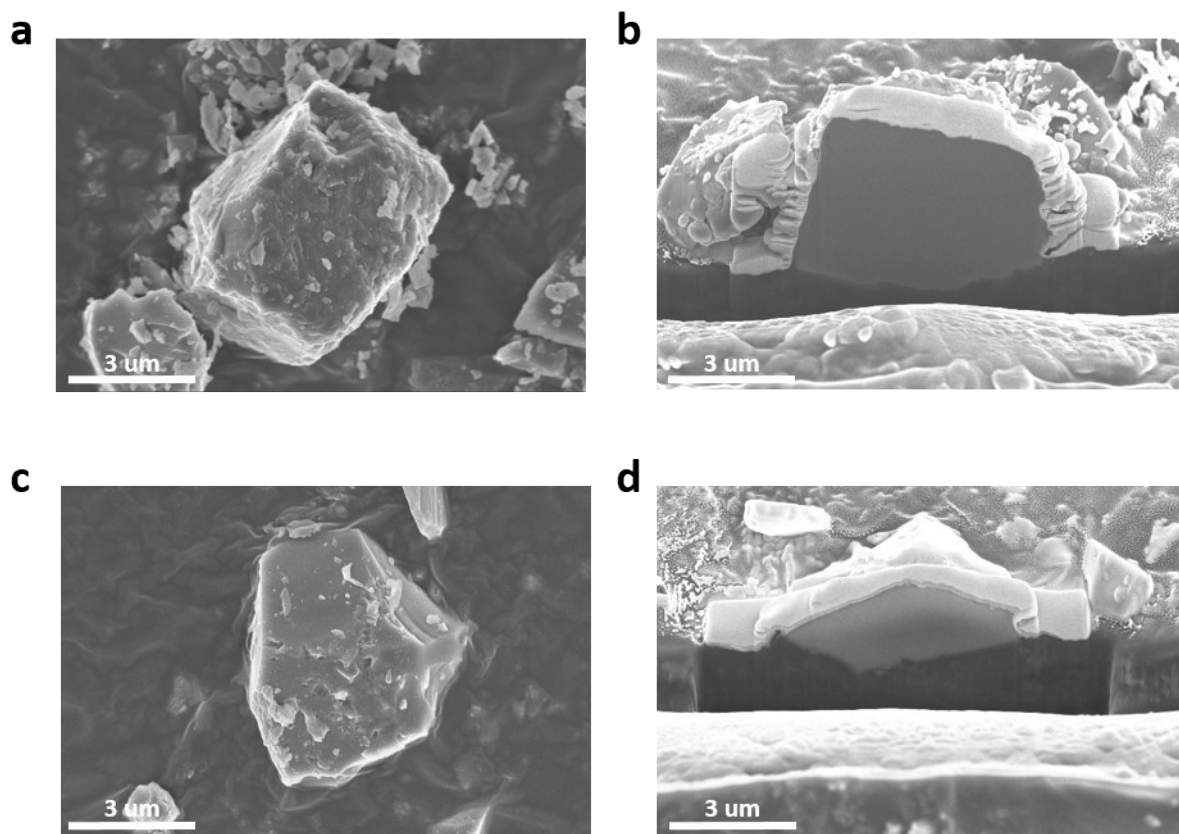
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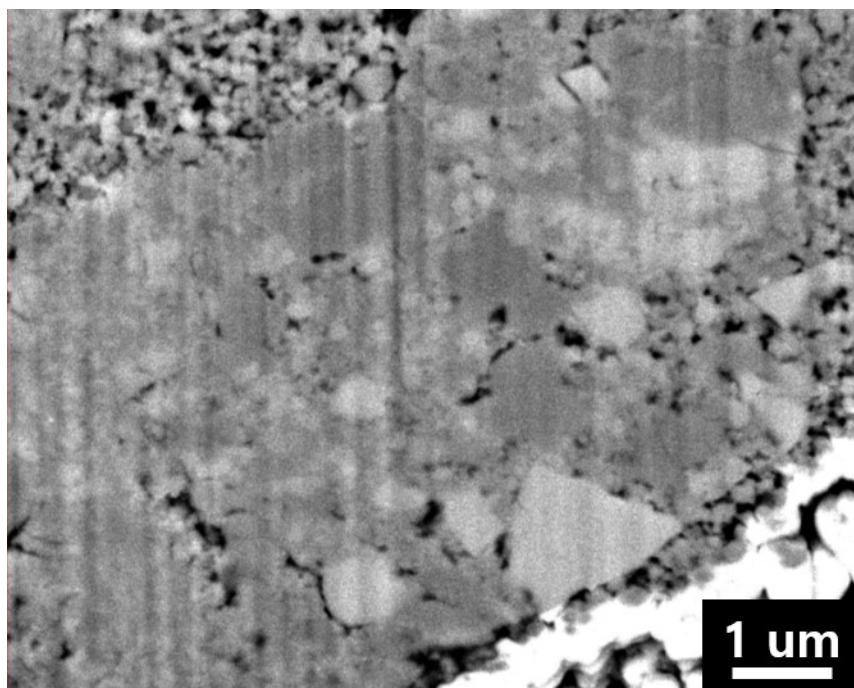
**Fig. S1** (a) Voltage profile for first cycle in a voltage window of 0.01-1.5 V vs. Li/Li<sup>+</sup> at a current density of 100 mA g<sup>-1</sup> and (b) cycle performance of micro-Si and SiO electrode.



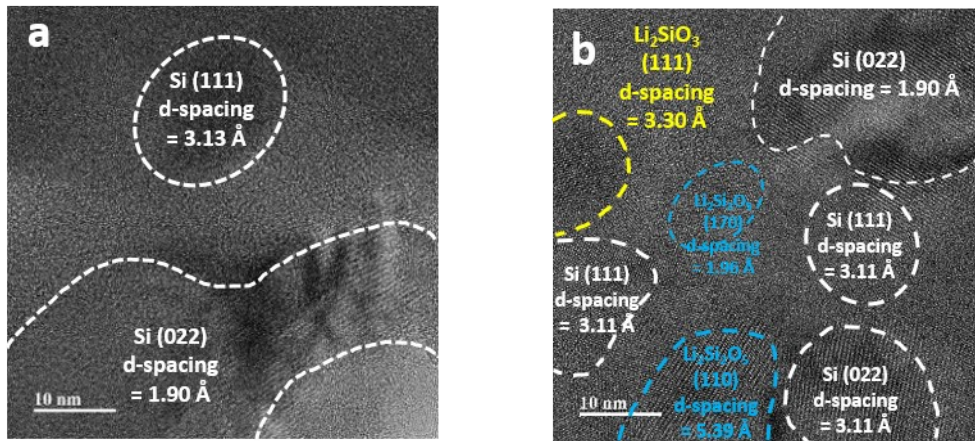
**Fig. S2** Differential capacity plots(DCP) of SSO-4, SSO-2.03, SSO-1, SSO-0.25 and LSSO electrodes.



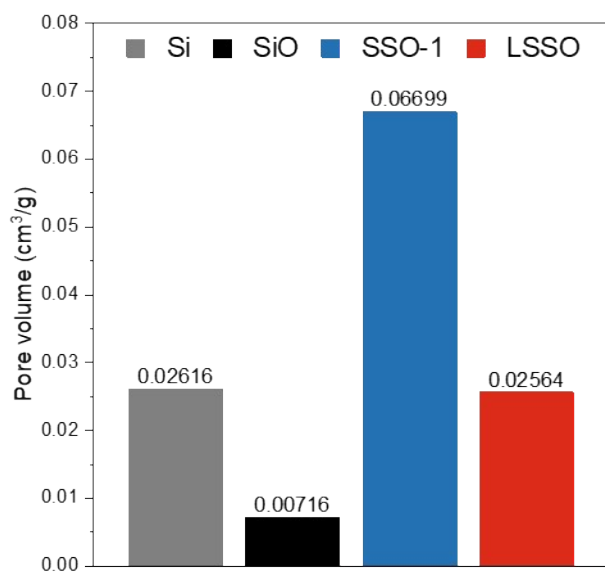
**Fig. S3** (a) Top view SEM image of Si, (b) cross-sectional SEM image of Si, (c) Top view SEM image of SiO<sub>2</sub>, and (d) cross-sectional SEM image of SiO<sub>2</sub>



**Fig. S4** Enlarged FIB-SEM image of the LSSO



**Fig. S5** HR-TEM of (a) SSO-1 and (b) LSSO, respectively.



**Fig. S6** Pore volume based on Barrett-Joyner-Halenda (BJH) method of Si, SiO, SSO-1 and LSSO