

## **Al<sub>2</sub>O<sub>3</sub> coating layer on mesoporous Si nanosphere for stable solid electrolyte interphase and high-rate capacity for lithium ion batteries**

Na Li,<sup>a1</sup> Zheng Yi,<sup>b1</sup> Ning Lin,<sup>b\*</sup> and Yitai Qian<sup>b</sup>

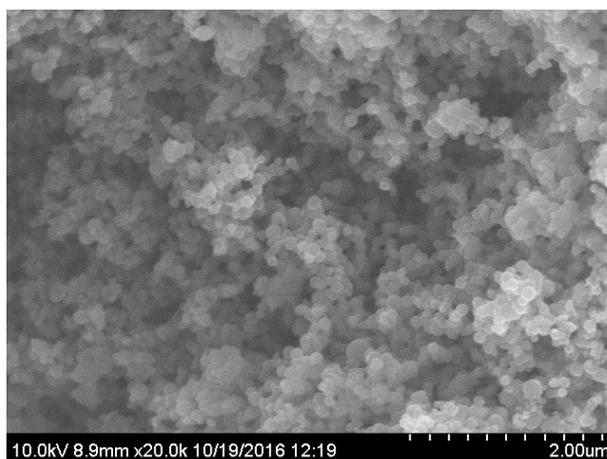


Fig.S1. The low-resolution SEM image of the commercial Nano-Al.

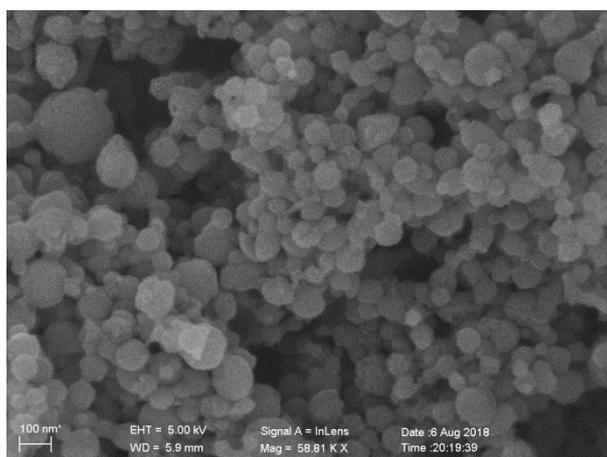


Fig.S2. The low-resolution SEM image of the obtained Si@Al<sub>2</sub>O<sub>3</sub> nanospheres.

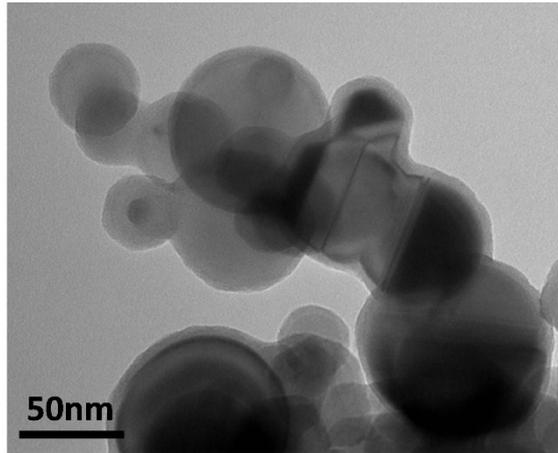


Fig.S3. The TEM image of the commercial Nano-Si.

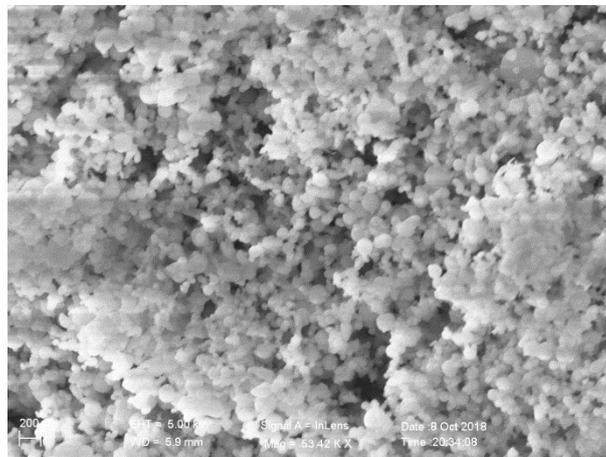


Fig.S4. The low-resolution SEM image of the commercial Nano-Si.

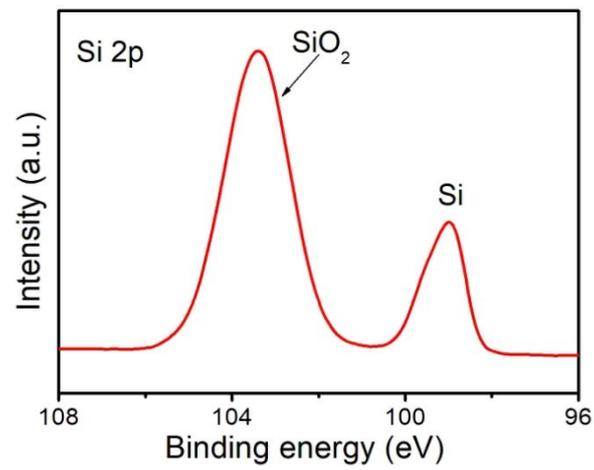


Fig.S5. The Si 2p spectrum of the commercial Nano-Si.

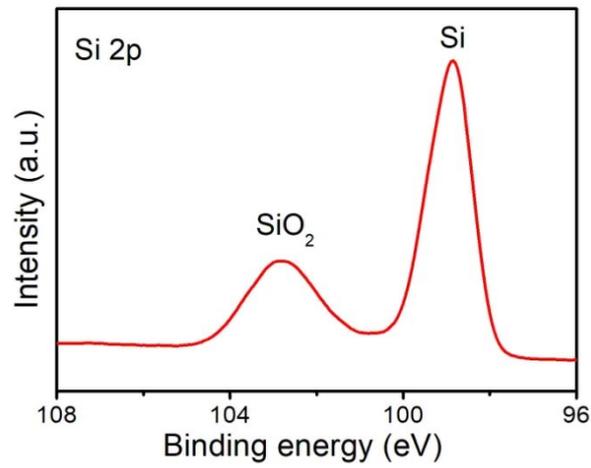


Fig.S6. The Si 2p spectrum of the obtained Si@Al<sub>2</sub>O<sub>3</sub> nanospheres.

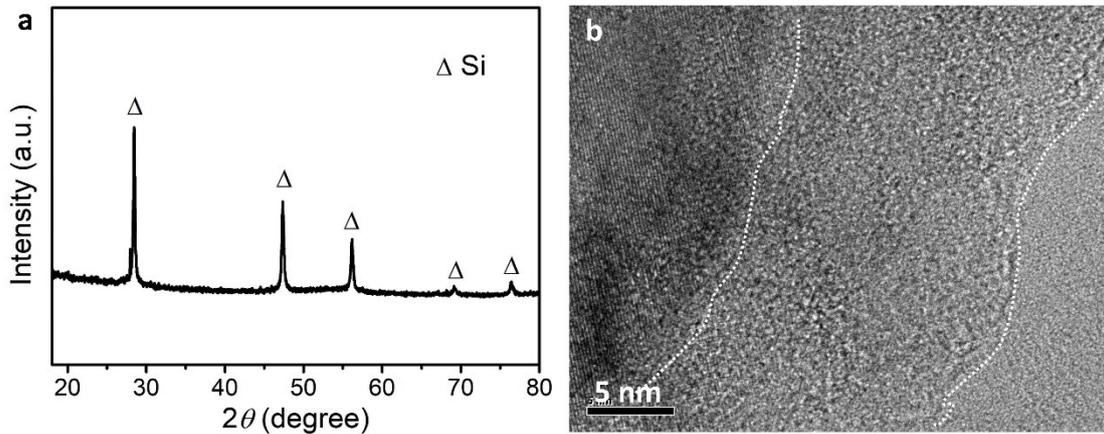


Fig.S7. The (a) XRD pattern and (b) HRTEM image of the Si@Al<sub>2</sub>O<sub>3</sub> composite using the pretreated Nano-Al as template.

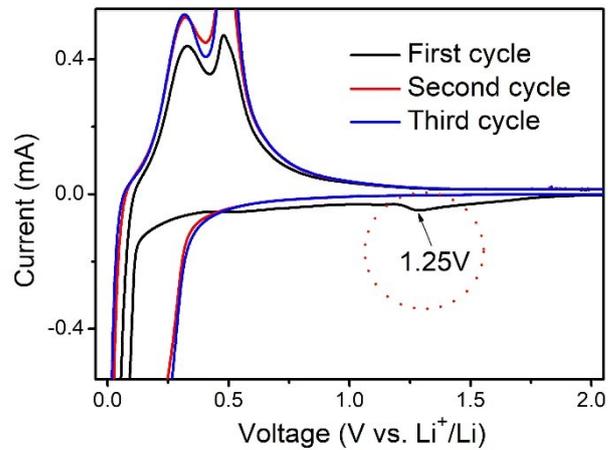


Fig.S8 An enlarged view of the CV curve in Fig.4a.

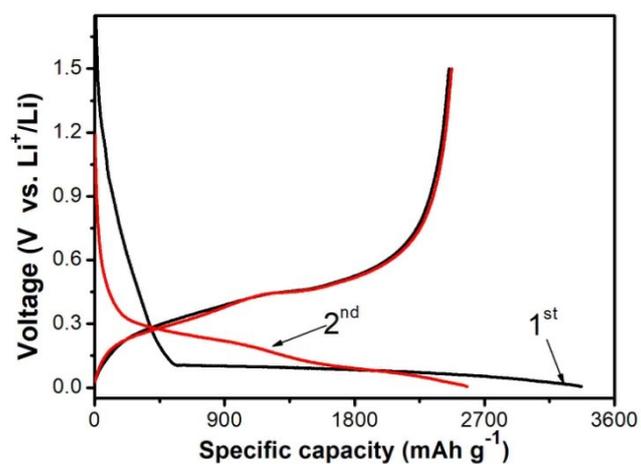


Fig.S9. The first two cycles of the charge/discharge curves of the Si@Al<sub>2</sub>O<sub>3</sub> nanospheres at current density of 0.5 A g<sup>-1</sup>.

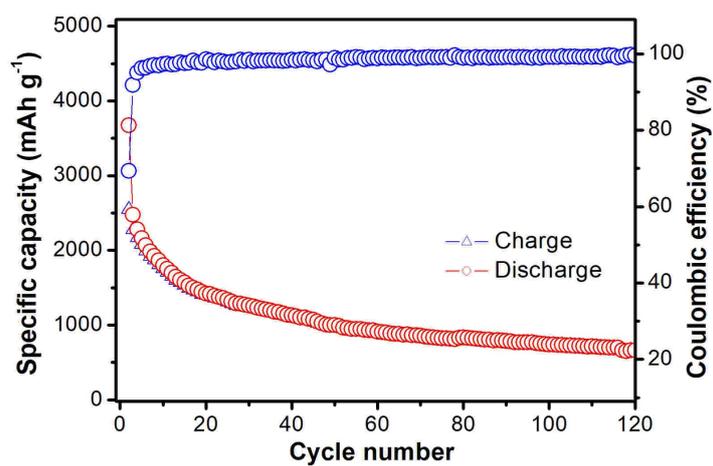


Fig.S10. The cycling performance of the commercial Nano-Si at current density of 0.5 A g<sup>-1</sup>.

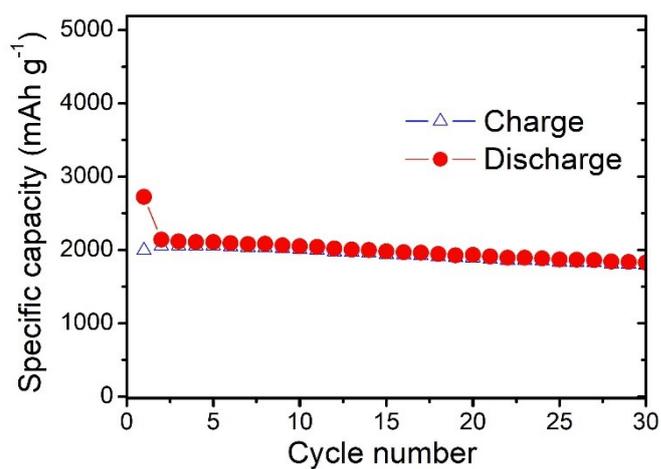


Fig.S11. The cycling performance of the Si@Al<sub>2</sub>O<sub>3</sub> composite with Al<sub>2</sub>O<sub>3</sub> layer of 10 nm at current density of 0.5 A g<sup>-1</sup>.

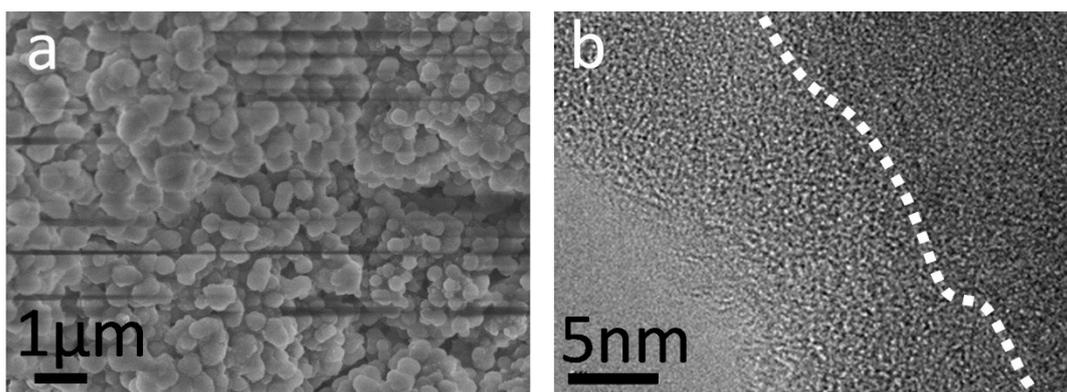


Fig.S12. (a) The low-resolution SEM image and (b) high-resolution TEM image of the Si@Al<sub>2</sub>O<sub>3</sub> nanospheres after 120 cycles.

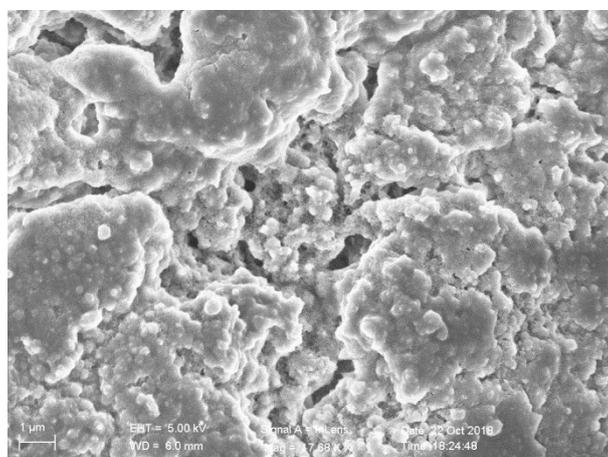


Fig.S13. The low-resolution SEM image of the commercial Nano-Si electrode after 120 cycles.

