Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supplementary Material:

Interfacial Encapsulation Stress Management of Micron-Sized Porous SiO Anodes for High-Energy Lithium-ion Batteries

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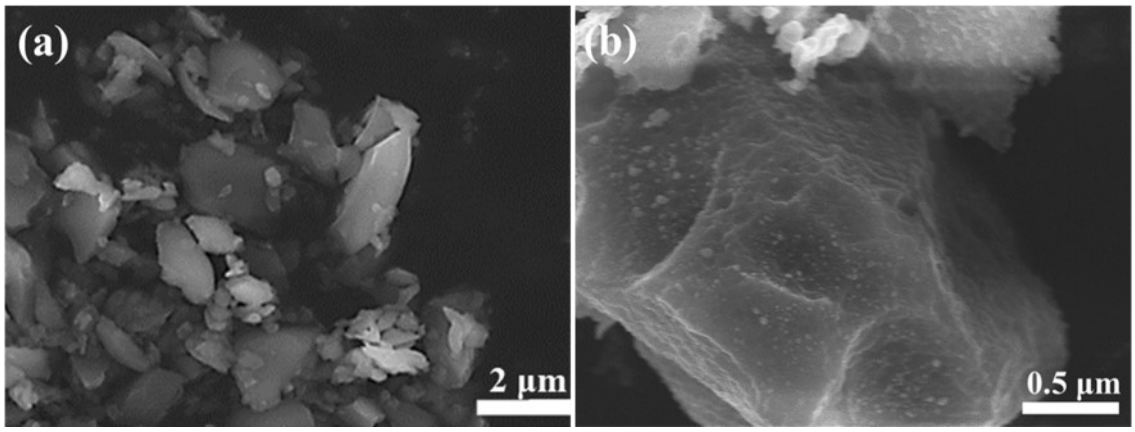

Fig. S1 SEM images of (a) SiO, (b) Ag-deposited SiO.

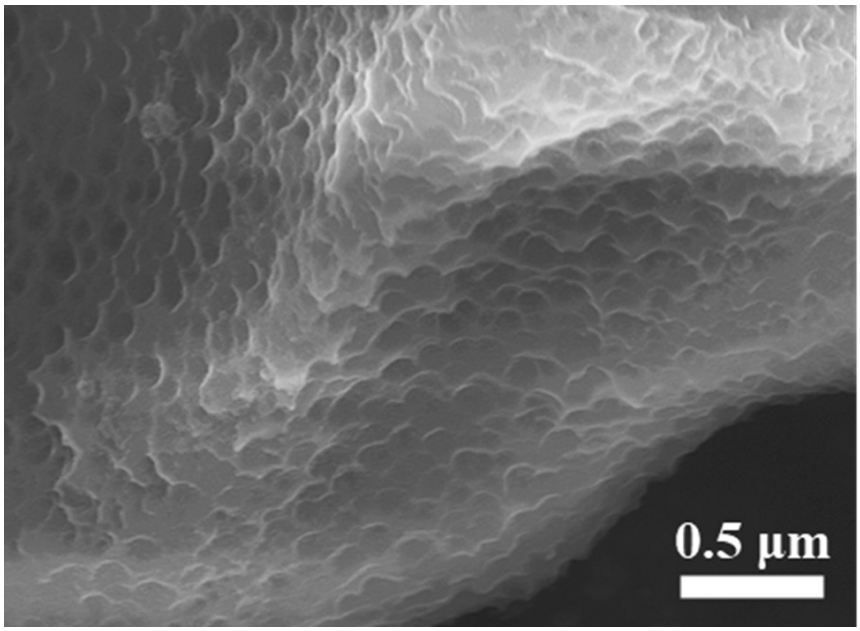

Fig. S2 SEM image of p-SiO.

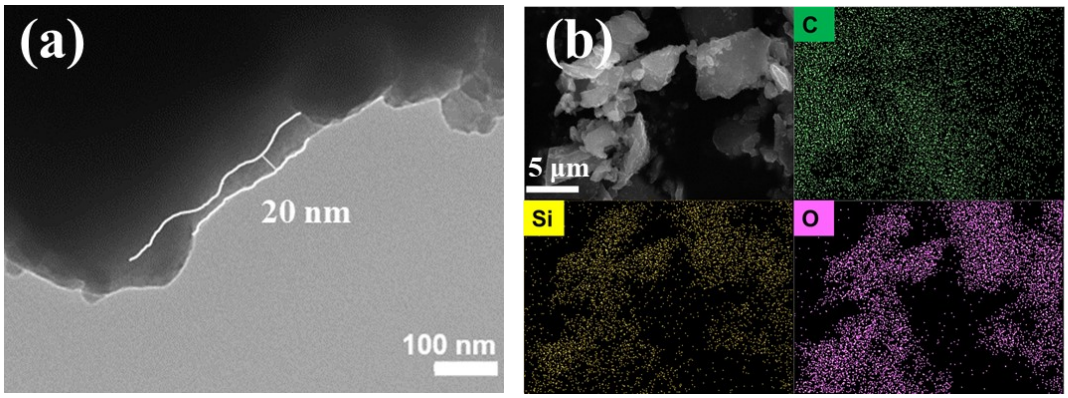

Fig. S3 TEM image (a) and (b) SEM image and corresponding elemental mapping of p-SiO@C.

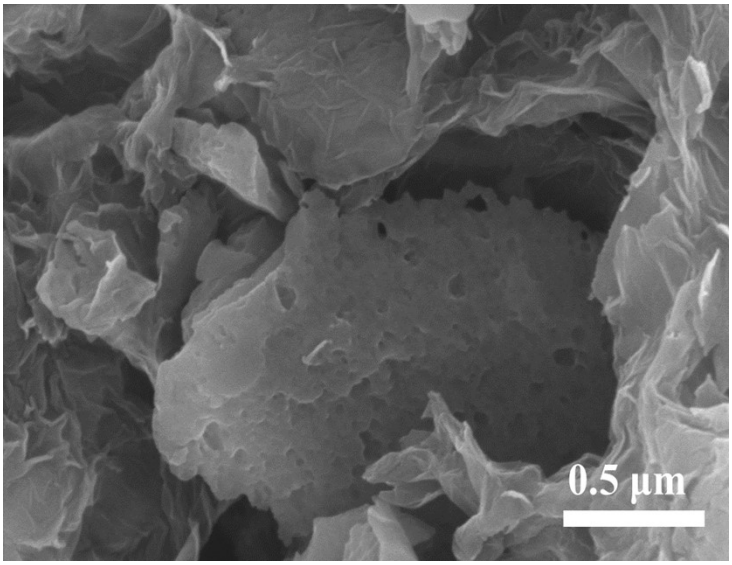

Fig. S4 SEM image of p-SiO@C@rGO.

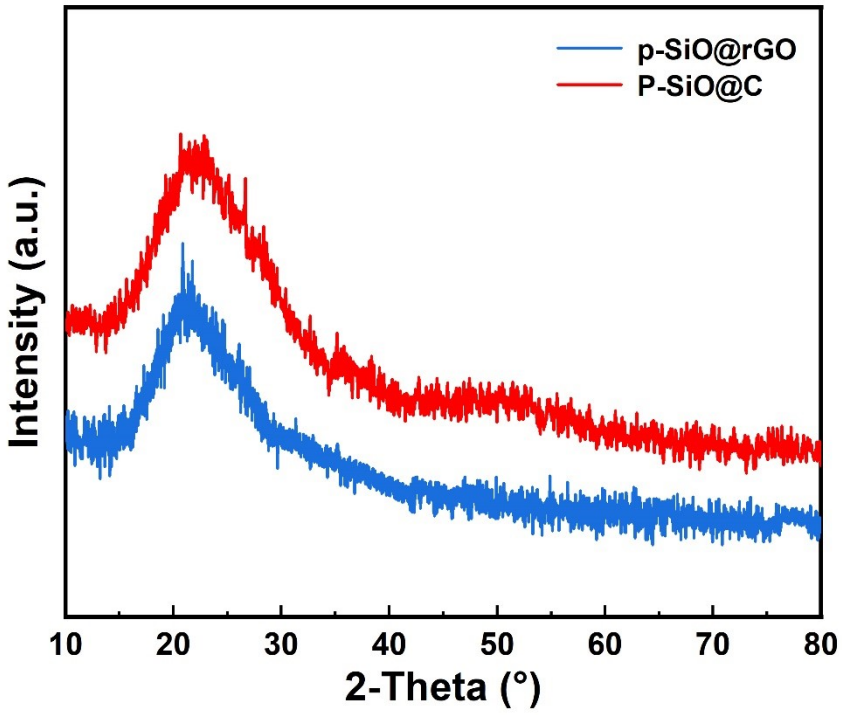

Fig. S5 XRD patterns of p-SiO@C and p-SiO@rGO.

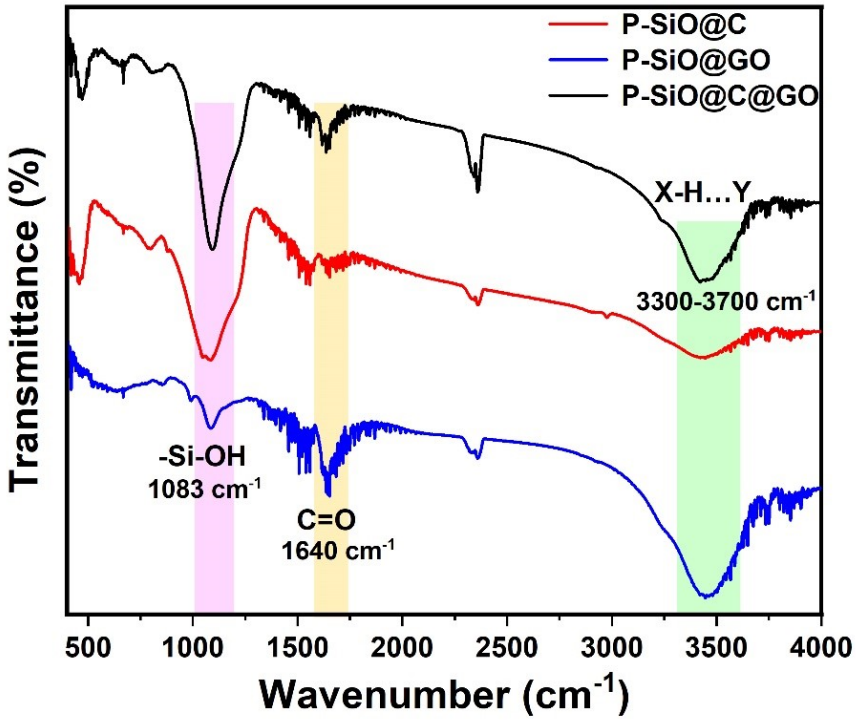

Fig. S6 FT-IR spectra of p-SiO@C@rGO, p-SiO@C, and p-SiO@rGO.

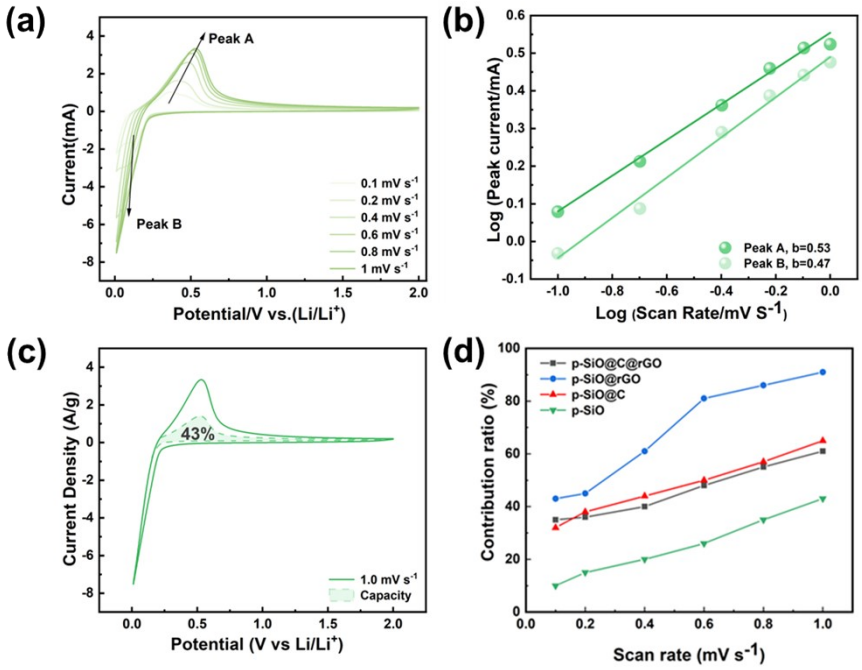

Fig. S7 (a) CV curves of p-SiO at various scan rates of 0.1-1.0 mV s^{-1}, (b) Relationship between the logarithm peak currents and logarithm sweep rates, and (c) Capacitive and diffusion-controlled contribution to charge storage at 1.0 mV s^{-1}. (d) The percentages of capacitive and diffusion-controlled capacities at different scan rates of p-SiO@C@rGO, p-SiO@C, p-SiO@rGO and p-SiO electrodes.

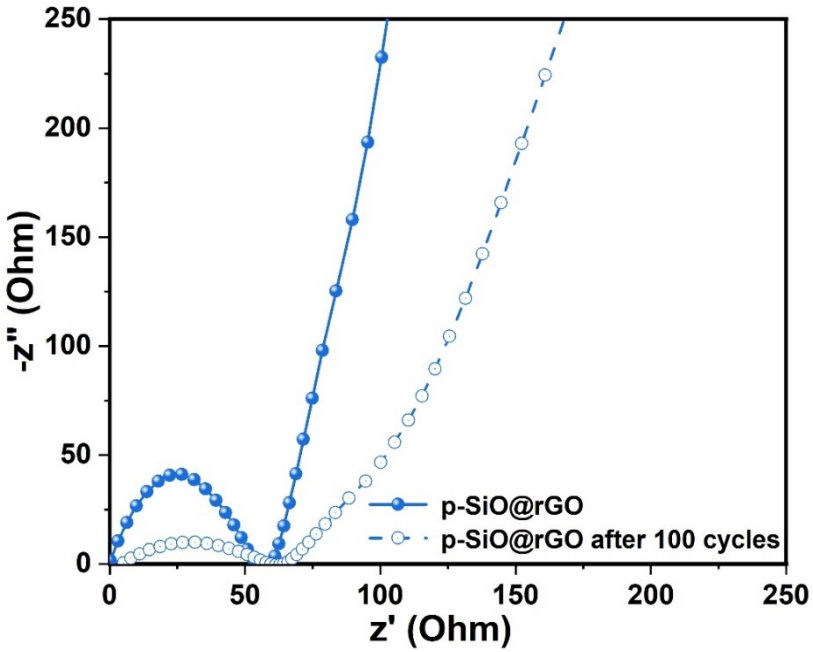

Fig. S8 Electrochemical impedance spectra of the p-SiO@rGO electrode.

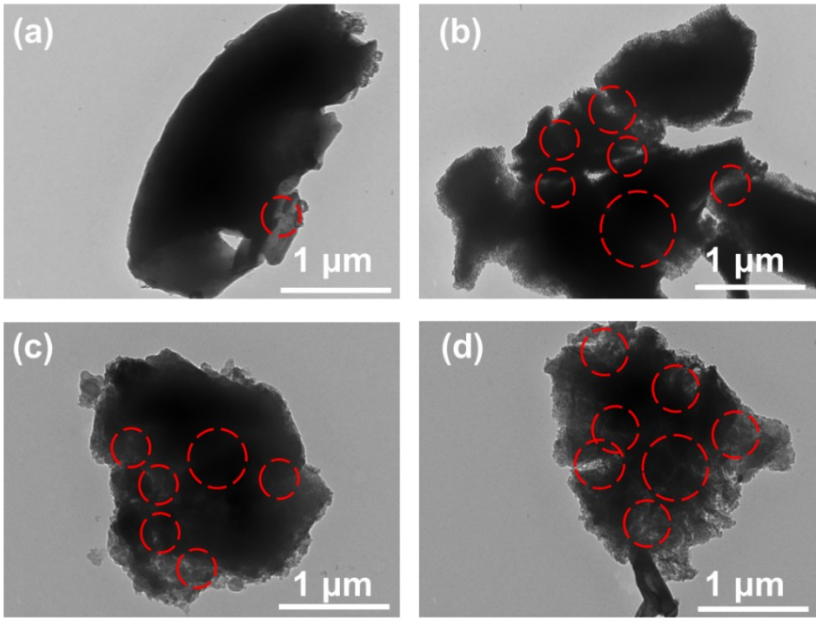

Fig. S9 TEM images of (a) p-SiO@rGO, (b) p-SiO@C, (c) p-SiO@C@rGO and (d) p-SiO electrodes after cycling. The surface cracks of the particles are marked with red dashed circles.

Table S1 Initial capacity information of four samples.

	Charge specific capacity /mAh g^{-1}	Discharge specific capacity /mAh g^{-1}	C ratio / %	Theoretical specific capacity /mAh g^{-1}	Initial lithiation extent /%
p-SiO	818.55	1470.7	0	2680.0	54.9
p-SiO@C	1635.9	2314.6	7.1	2516.1	92.0
p-SiO@rGO	1757.0	2299.9	13.9	2359.2	97.5
p-SiO@C@rGO	1298.8	2086.5	20.2	2213.8	94.2

The reversible ratio capacity was calculated as follows:

Taking p-SiO@rGO as an example: Based on the ratio (13.9 %) of C content in p-SiO@rGO and the theoretical capacity (372 mAh g^{-1}), it is known that 86.1 % of p-SiO with a theoretical capacity of 2680 mAh g^{-1}. The theoretical capacity of p-SiO@rGO can be calculated as 2359.2 mAh g^{-1} (13.9 % × 372 mAh g^{-1} + 86.1 % × 2690 mAh g^{-1}). And then, the reversibility of p-SiO@rGO was calculated to be 97.5% using the following equation.

$$Initial\ lithiation\ extent = \frac{Discharge\ specific\ capacity}{Theoretical\ specific\ capacity}\%$$