

Supporting information

Waterbeds inspired stress relaxation strategies of patterned silicon anode to realize the fast-charging and longevity lithium microbatteries

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Table S1. The detailed size of various mesh of the copper microgrids used in this study.

Average size (μm)	30-mesh	100-mesh	250-mesh
Square pore	500	200	50
Wire array	150	50	10

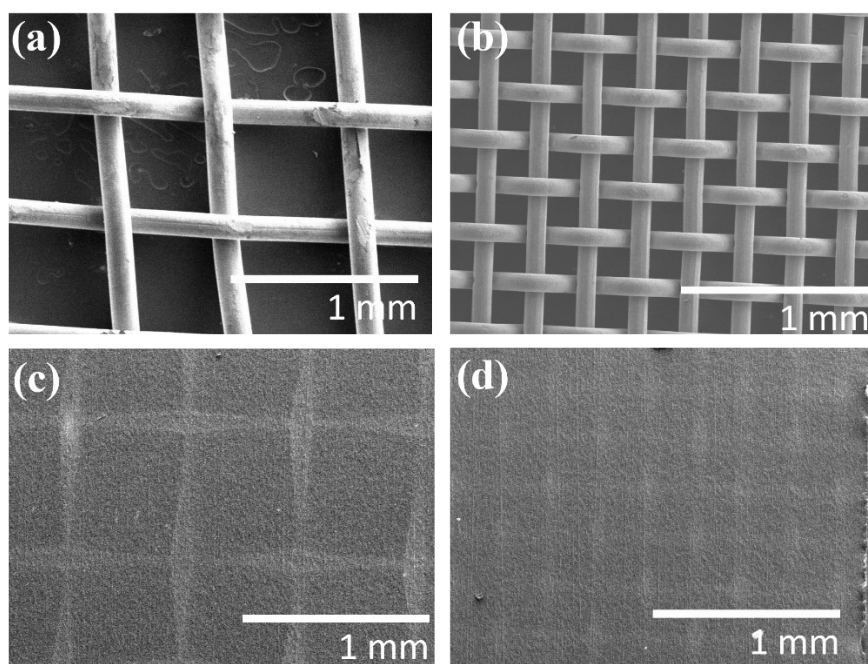


Figure S1. SEM images showing topography of the copper microgrid: (a) 30 Mesh, (b) 100 Mesh, and corresponding patterned Si of (c) P-Si30M, (d) P-Si100M.

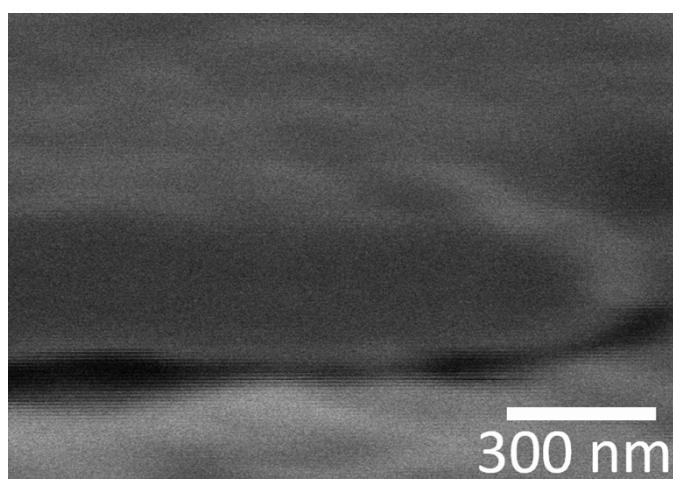


Figure S2. The cross-section SEM image of P-Si250 M electrode.

Table S2. The lithiation/delithiation capacity, ICE of 1st cycle, and the capacity retention after 200 cycles at 1 C rate correspond to each electrode.

	1st lithiation capacity (mAh/g)	1st delithiation capacity (mAh/g)	ICE (%)	Retention (%)
A-Si	3424.5	2993.7	87.4	9.1
P-Si30M	2440.8	2049.3	84.0	21.6
P-Si100M	2829.2	2164.3	76.5	36.4
P-Si250M	2665.9	2028.8	76.1	46.6

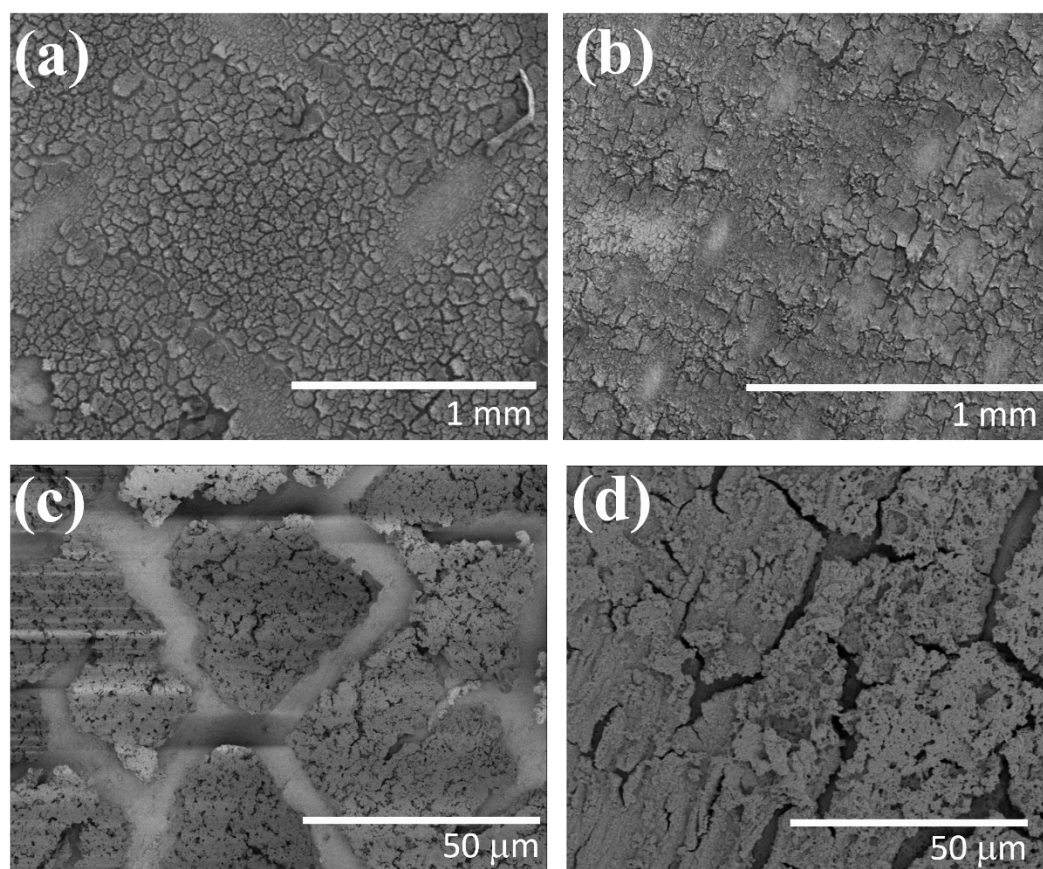


Figure S3. SEM images showing topography of the disassembled patterned Si electrodes at low-magnification 50x and high-magnification 1000x for (a, c) P-Si30M, (b, d) P-Si100M.

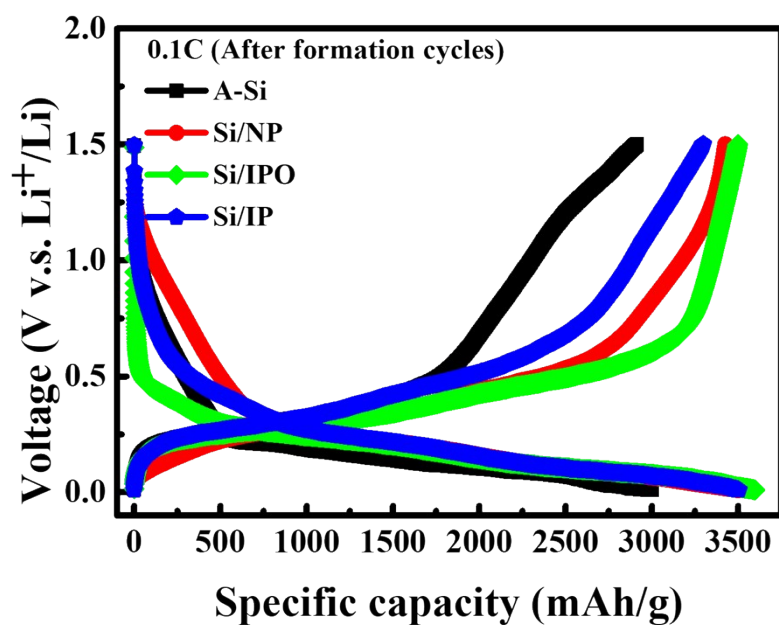


Figure S4. The charge/discharge curves at 0.1 C after formation cycles.

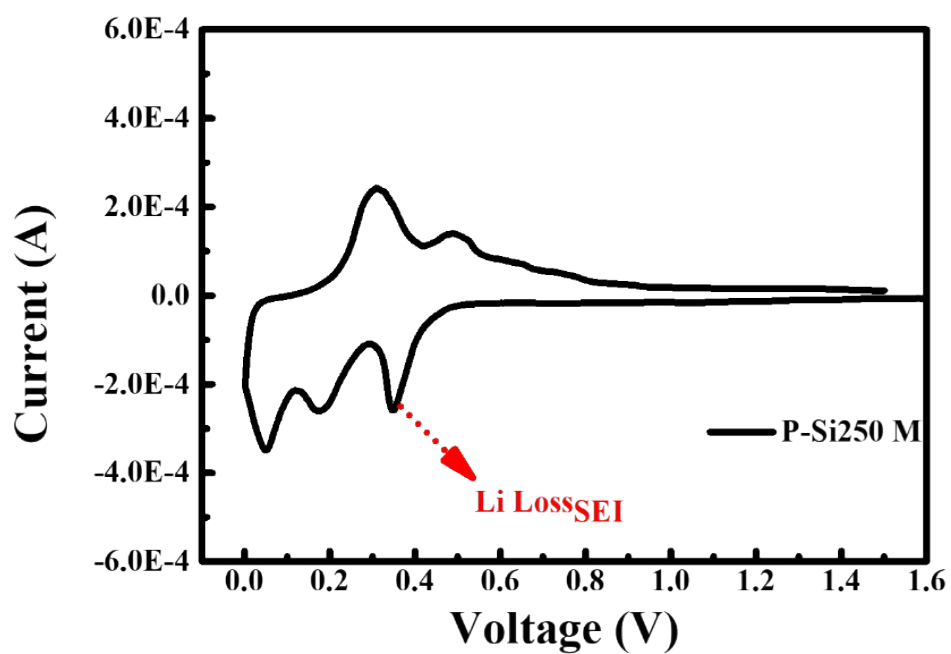


Figure S5. 1st cycle CV curves at a scan rate of 0.1 mV/s of P-Si250 M patterned Si electrode.

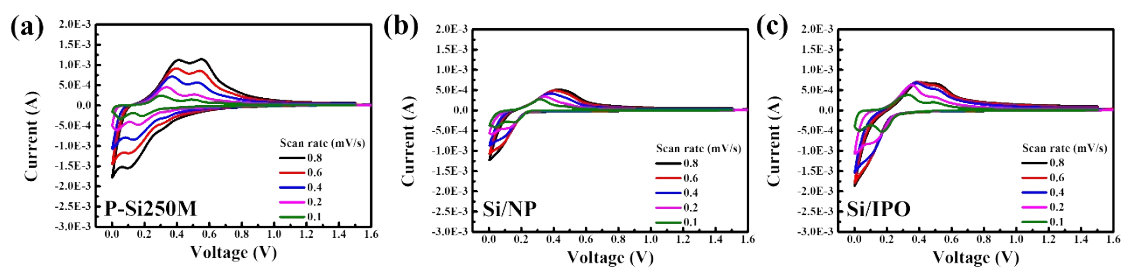


Figure S6. CV curves at different voltage scan rates from 0.1 to 0.8 mV/s: (a) P-Si250 M, (b) Si/NP, and (c) Si/IPO electrodes.

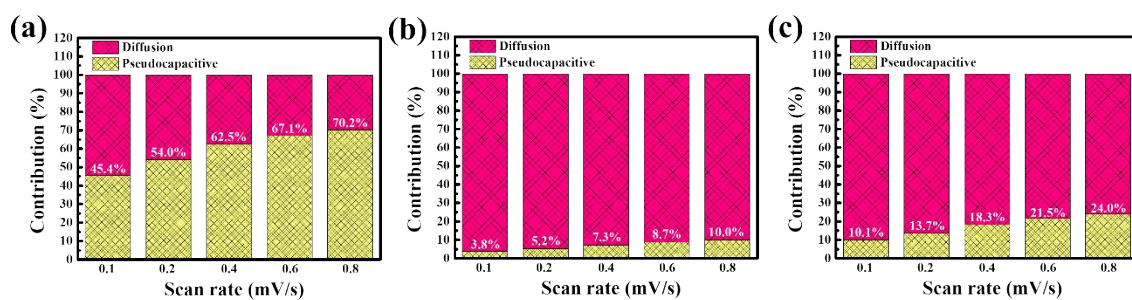


Figure S7. Contribution ratio of the pseudocapacitive and diffusion controlled charge versus scan rate: (a) P-Si250 M, (b) Si/NP, and (c) Si/IPO electrodes.