Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Copper nanowires based current collector for light-weight and flexible composite silicon anode with high stability and specific capacity

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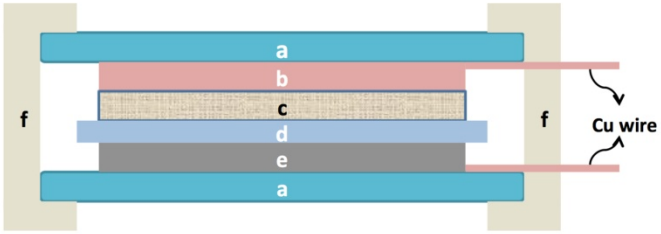

a. PTFE plate b. Cu foil c. Cu nanowire d. filter membrane e. Pt electrode f. fixtures

Figure S1. Schematic of the device for tight contact electrodeposition.

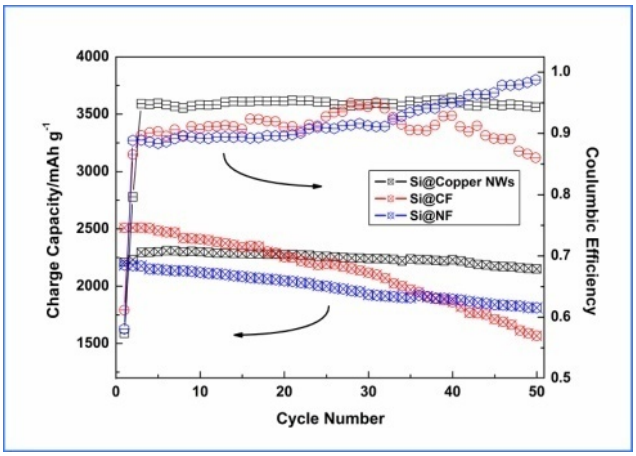

Figure S2. Cycle performances of Si@CuNWs, Si@CF and Si@NF electrodes.

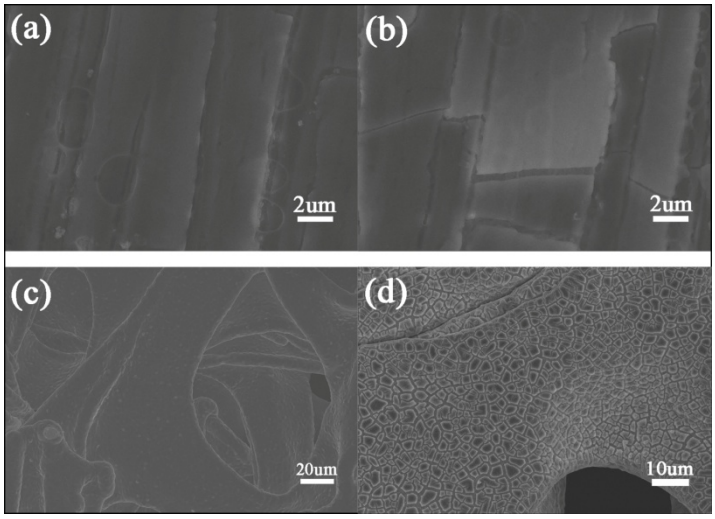

Figure S3. (a) and (b) SEM image of morphology change of Si@CF electrodes before cycling and after 5 cycles. (c) and (d) SEM image of morphology change of Si@NF electrodes before cycling and after 50 cycles.

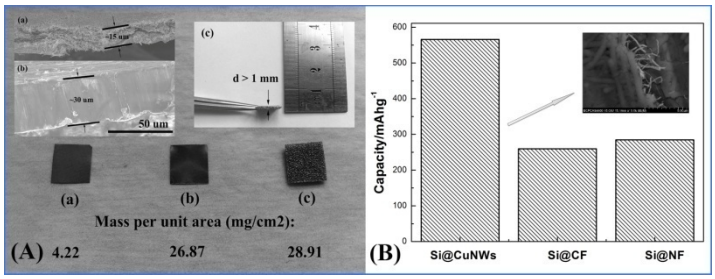

Figure S4. (a) Data of mass per unit area of copper nanowires, copper foil, and nickel foam, relatively. (b) Specific capacity profiles of composite electrodes of Si@CuNWs, Si@CF and Si@NF, considering the weight of active materials and current collector supported.

Table 1. Composition of the water bath.

Components	Concentration
$Cu(NO_3)_2$	0.5 M
NaOH	7 M
$N_2H_4 \cdot H_2O$	35 wt%
EDA	99 wt%

Table 2. Sheet resistance of untreated and treated thin film current collectors ($\Omega\ \square^{-1}$)

	Untreated current collector		Treated current collector	
	Position A	Position B	Position A	Position B
①	308.8	308.8	3.85	3.67
②	329.9	330.4	4.03	3.88
③	328.7	324.5	4.53	3.96
④	331.7	335.2	3.47	3.50
⑤	310.8	311.2	3.98	4.13

Table 3. Kinetic parameters of composite silicon electrode after 1st and 60th cycle

	R_S (Ω)	R_{sei} (Ω)	R_{ct} (Ω)	CPE_1 (F)	CPE_2 (F)
1st (untreated Cu network)	7.2	28.8	282.6	5.1×10^{-6}	5.9×10^{-6}
1st	6.7	13.5	161.2	7.7×10^{-6}	1.1×10^{-5}
60th	6.6	12.1	198.2	8.4×10^{-6}	1.2×10^{-5}