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Evolution of disposable bamboo chopsticks into uniform carbon fibers: A smart strategy to fabricate sustainable anodes for Li-ion batteries

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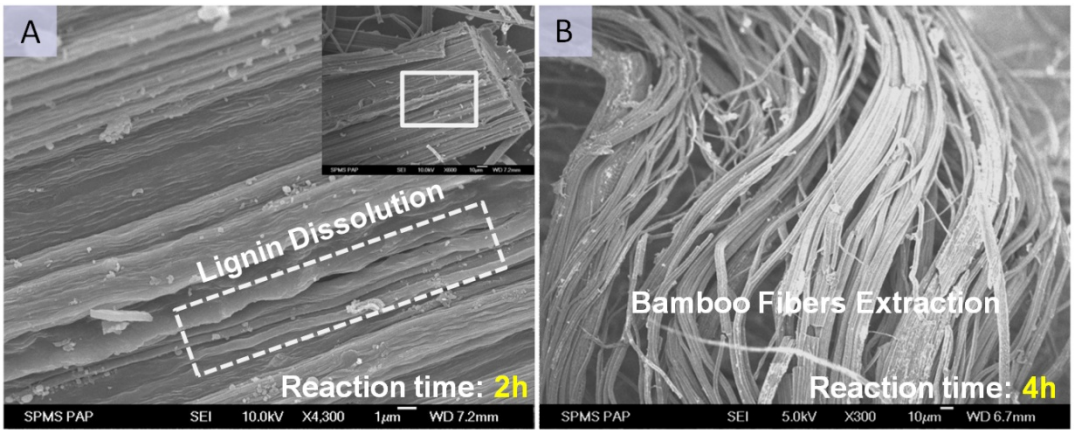

Fig. S1 SEM images of the intermediate products fabricated in 3M KOH solution with a hydrothermal reaction time of (A) 2h and (B) 4h, respectively.

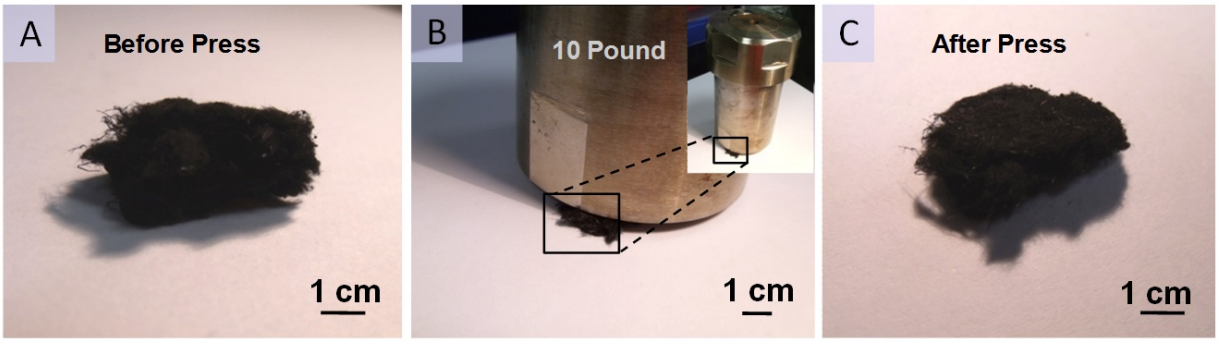

Fig. S2 Optical images showing the attained carbon fibers possess good toughness. No visible changes appear even when fiber samples suffer from a 10-pound weight press.

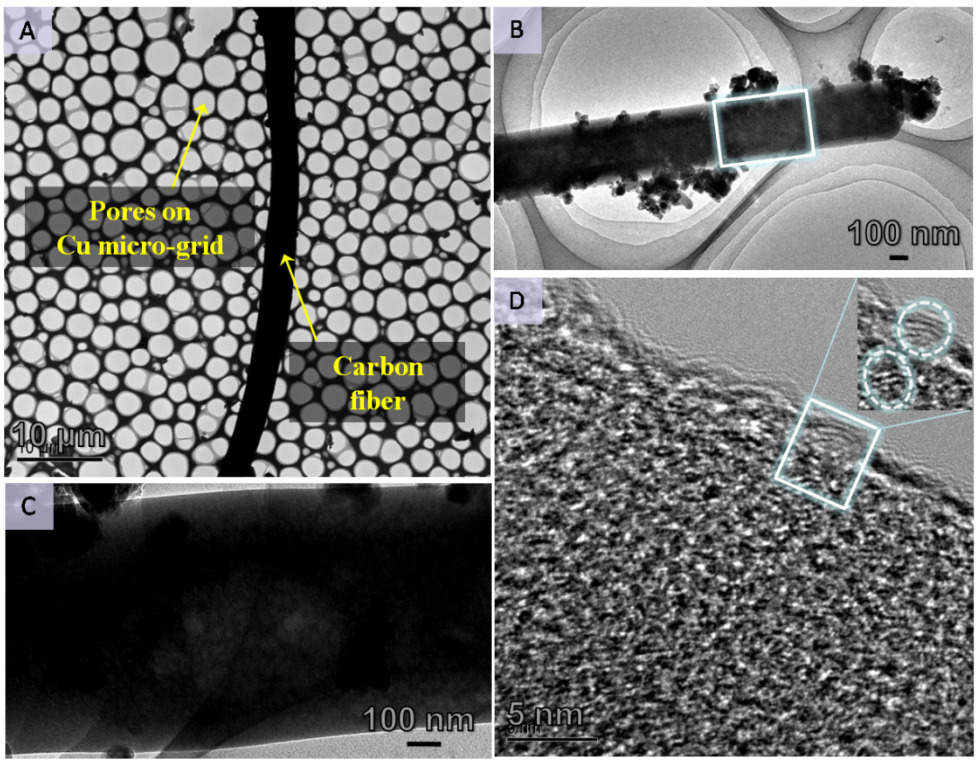

Fig. S3 TEM/HRTEM observations toward the produced carbon fibers.

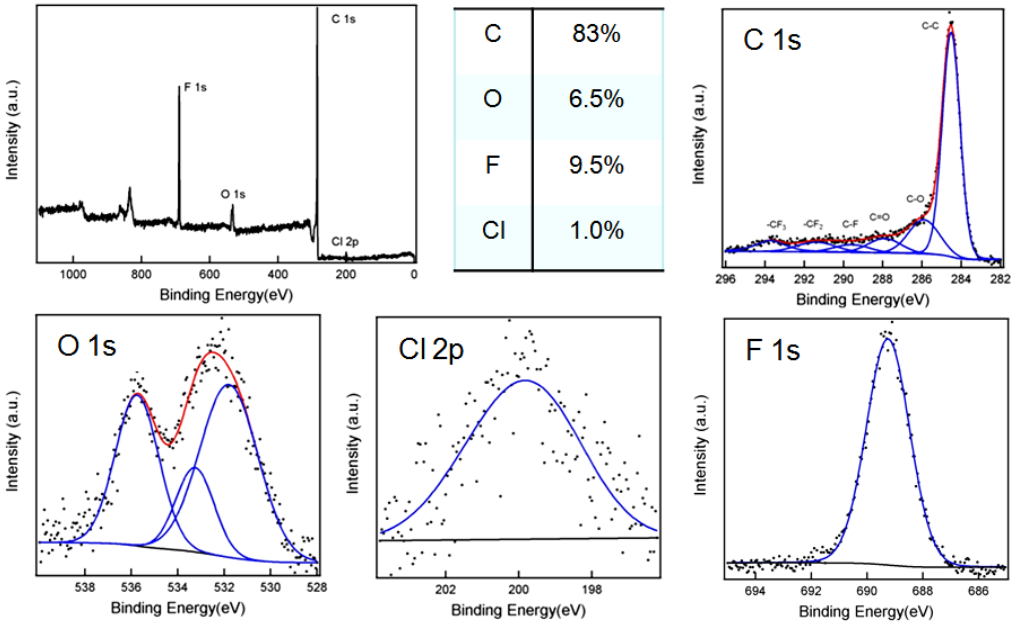

Fig. S4 XPS spectra obtained from the evolved carbon fibers.

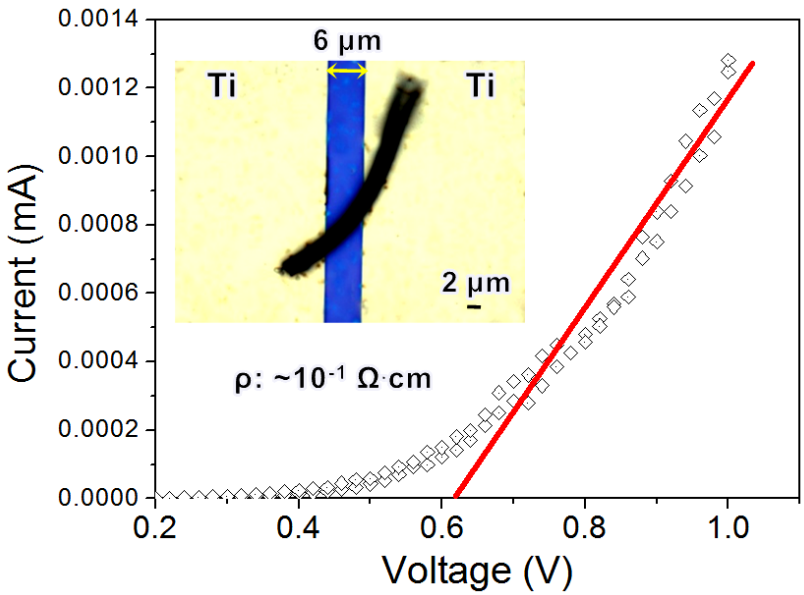

Fig. S5 Electrical performance of a single carbon fiber.

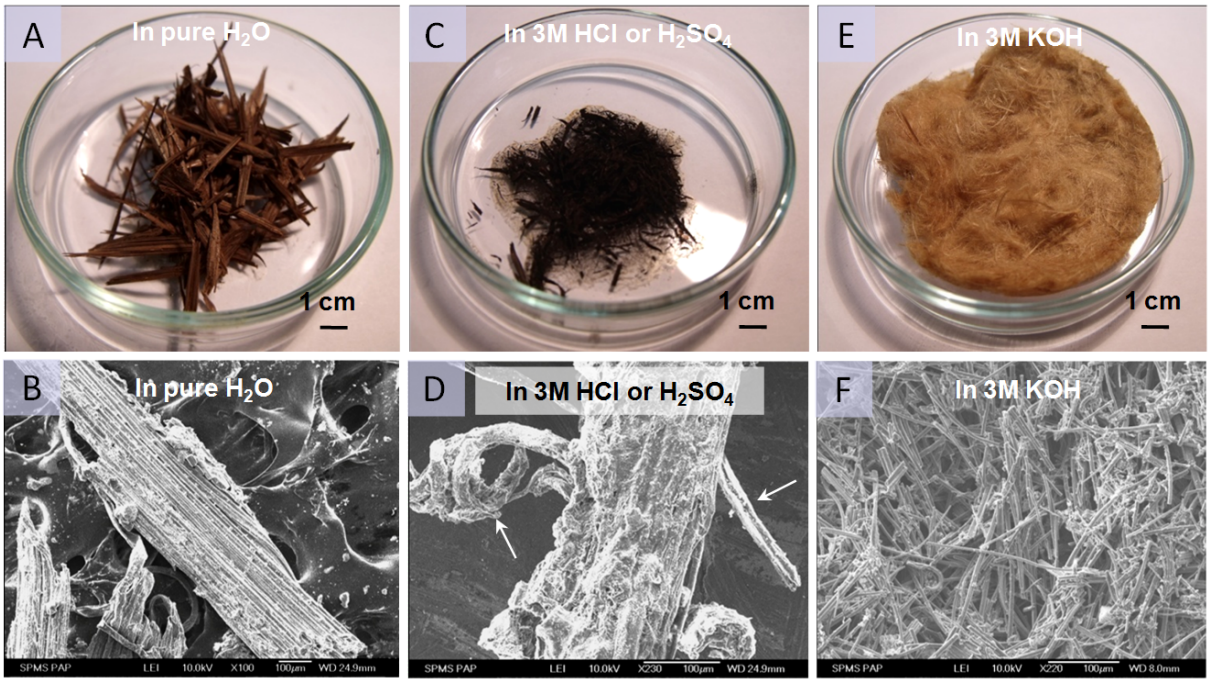

Fig. S6 Optical and SEM images of samples made by a hydrothermal treatment in different atmospheres: (A, B) in pure H_2O; (C, D) in 3M HCl or H_2SO_4; (E, F) in 3M KOH, respectively.

Items	**Anodic material cost for 10000 coin-type cells** (Assuming each cell contains ~100 mg active anodic materials)	
	For chopsticks-derived carbon fibers	For commercial battery-grade graphite
Raw Materials	**0** (Chopsticks are all recycled from wastes)	**$ 27** (Unit Price of unprocessed graphite: $12/lb)
Consumables in fabrication processes (e.g., KOH, Ar gas, water, acids, etc.)	**$ 21** (Used for fibers extraction) (Unit Price of KOH for industrial use: $ 0.42/lb)	**$ 6-12** (Used for graphite processing)
Energy consumption in fabrication processes (e.g., electricity, etc.)	**$ 9-20** (Used for fibers extraction & calcination)	**$ 6-15** (Used for graphite processing)
Total cost	**$ 30-41**	**$ 39-54**

Table S1 Cost comparison of anodic materials made from chopsticks-derived carbon fibers and commercially used graphite, respectively

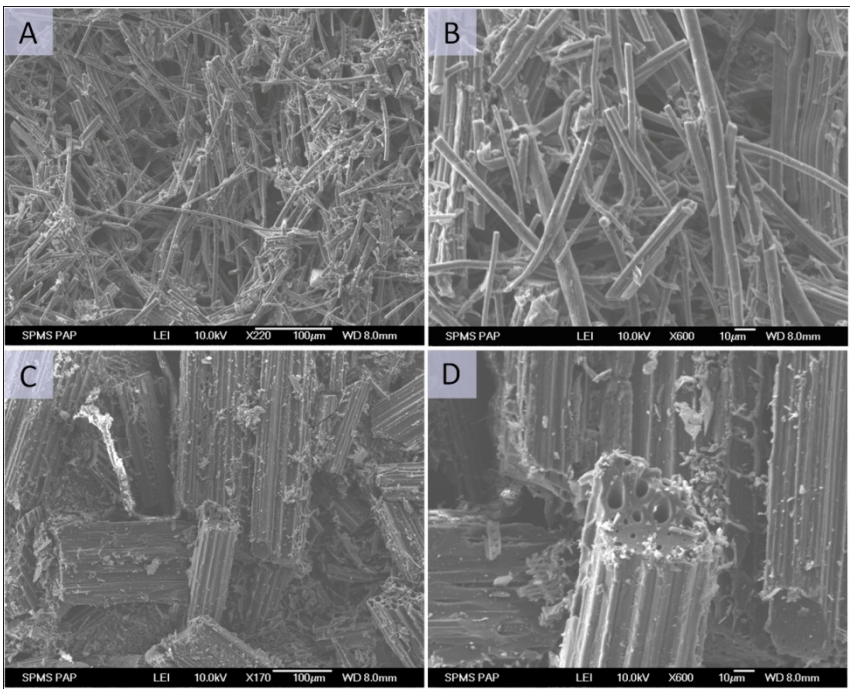

Fig. S7 SEM observations on samples tested as the anode of LIBs: (A, B) carbon fibers; (C, D) bulky bamboo carbons.

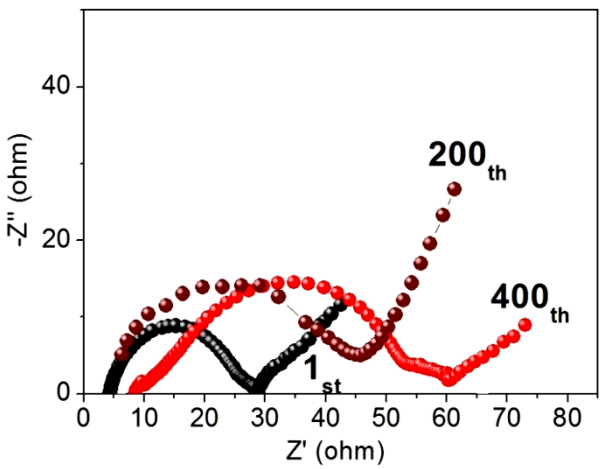

Fig. S8 EIS spectra of the produced carbon fibers upon cycling.

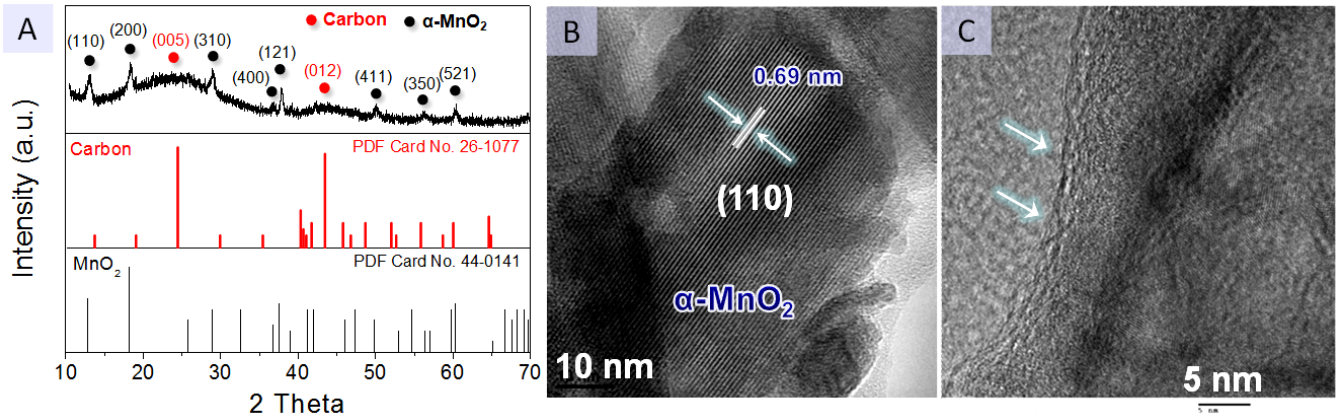

Fig. S9 (A) XRD pattern of C/MnO_2 NWs/carbon fibers hybrid. (B-C) TEM/HRTEM images of the hybrid product. TEM observation in Fig. S6 (C) indicates a carbon layer coating on MnO_2 surface.

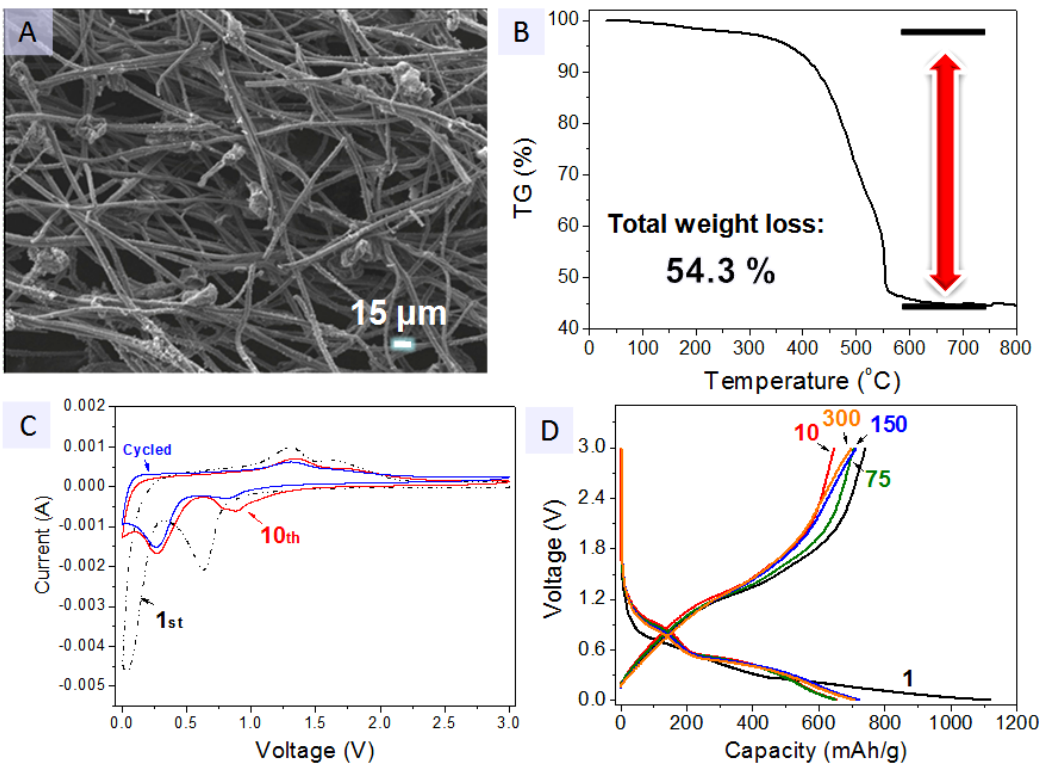

Fig. S10 (A) Large-scale SEM observation, (B) TGA plot, (C) CV curves and (D) charge-discharge profiles of the C/MnO_2 NWs/carbon fibers hybrid.