ADVANCED MATERIALS

Supporting Information

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Novel Electric Double-Layer Capacitor with a Coaxial Fiber Structure

*Xuli Chen, Longbin Qiu, Jing Ren, Guozhen Guan, Huijuan Lin, Zhitao Zhang, Peining Chen, Yonggang Wang, and Huisheng Peng**

Supporting Information

Experimental Section

Carbon nanotube (CNT) arrays were synthesized by a typical chemical vapor deposition method. In a quartz tube furnace, Fe (1.2 nm)/Al_2O_3 (3 nm) on a silicon wafer was used as catalyst, ethylene was used as carbon source, and a mixture of Ar and H_2 gases was used as carrying gas. The growth temperature of CNT arrays was controlled at 740 ^oC, and the growth time was ranged from 10 to 20 min. After highly aligned CNT arrays were synthesized, CNT sheets were spun from the as-synthesized CNT arrays. In more details, a blade was adhered to the edge of a CNT array, and the CNT sheet was then continuously pulled out of the array. Similarly, CNT fiber was also spun from the CNT array, and a rotating plane was used to spin the fiber typically with a speed of 2000 rpm. A rotating tube was then used to collect the fiber typically with a speed of 15 cm min^{-1}.

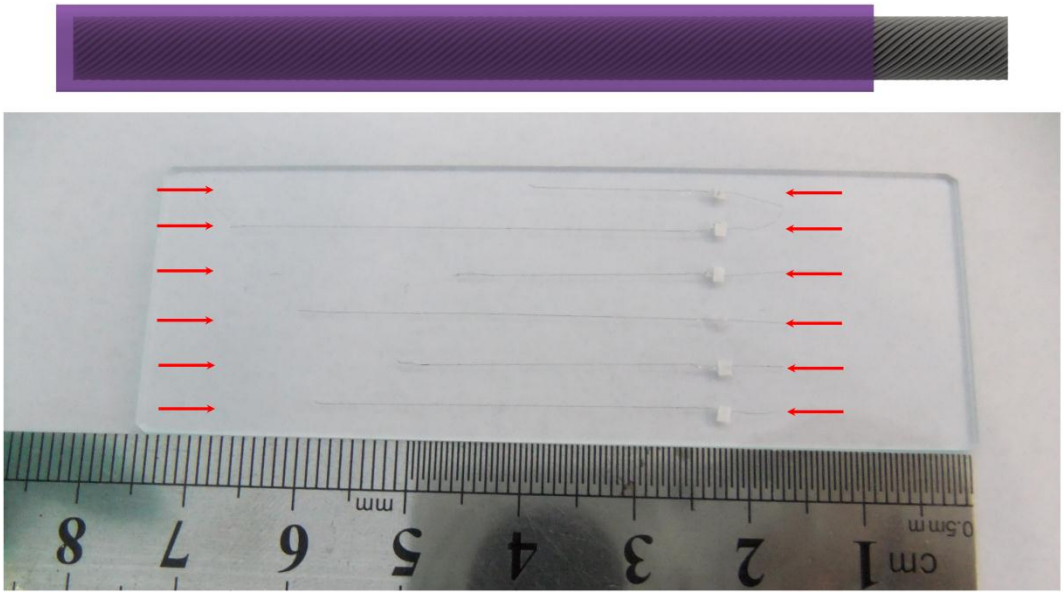

Figure S1. Scheme and photograph of CNT fibers coated with the poly (vinyl alcohol)/H_3PO_4 electrolyte. The red arrows show the coated CNT fibers.

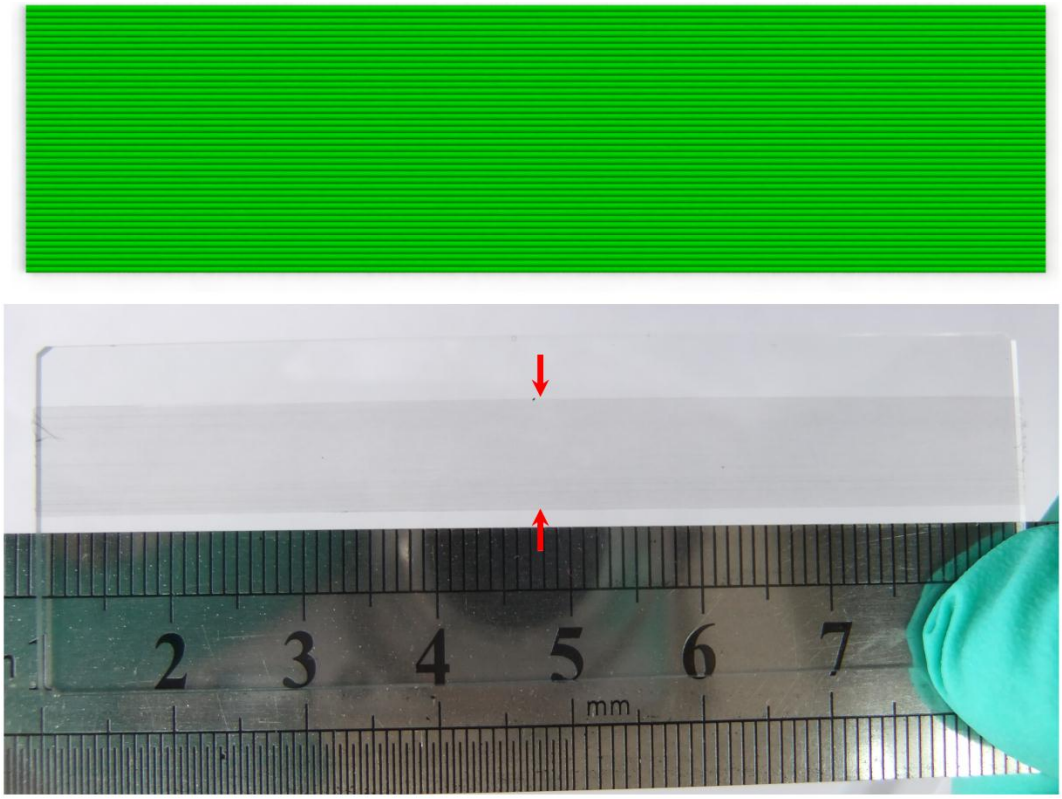

Figure S2. Scheme and photograph of the CNT sheet. The red arrows show the CNT sheet which was used to fabricate the EDLC fiber.

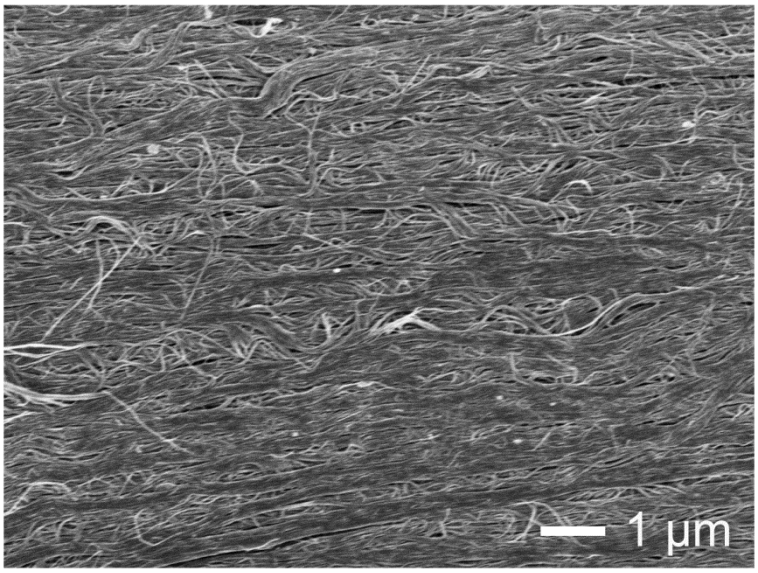

Figure S3. High resolution scanning electron microscopy (SEM) images of a CNT sheet being covered on a CNT fiber which had been incorporated with the poly (vinyl alcohol)/H_3PO_4 electrolyte. This image corresponds to Figure 2c but at a higher magnification.

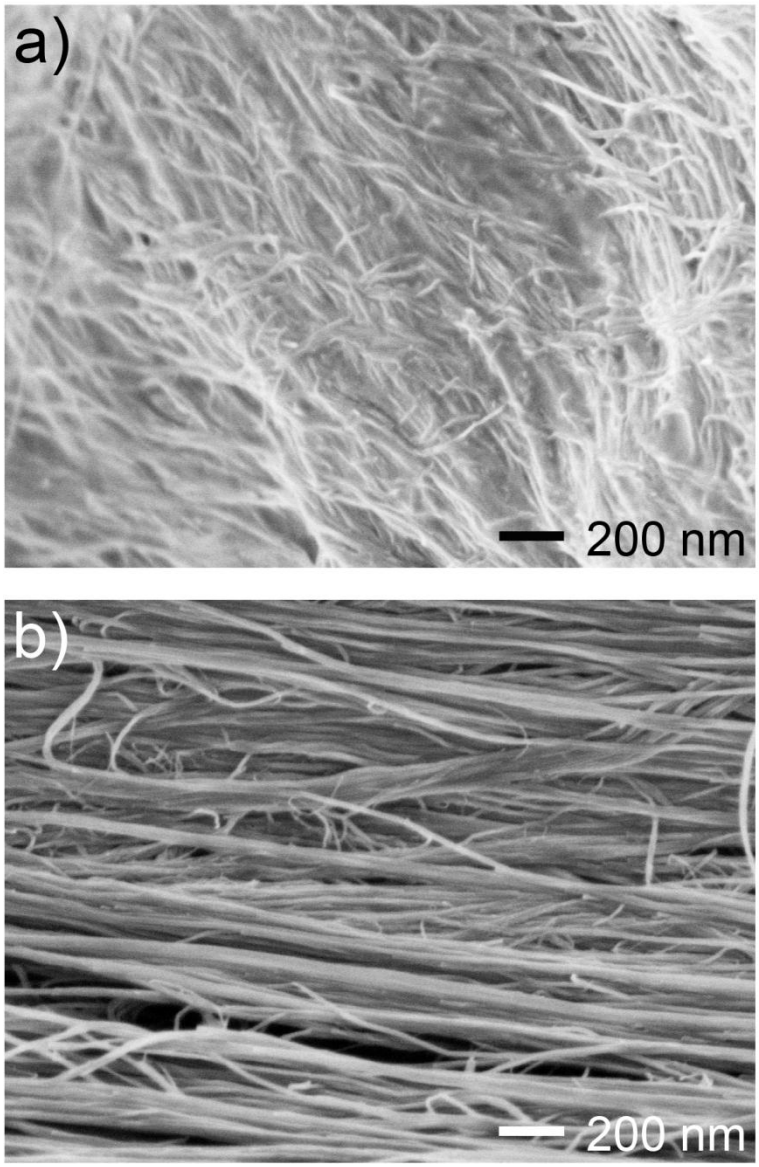

Figure S4. SEM images of (a) a CNT fiber being incorporated with the poly (vinyl alcohol)/H_3PO_4 electrolyte and (b) a bare CNT fiber.

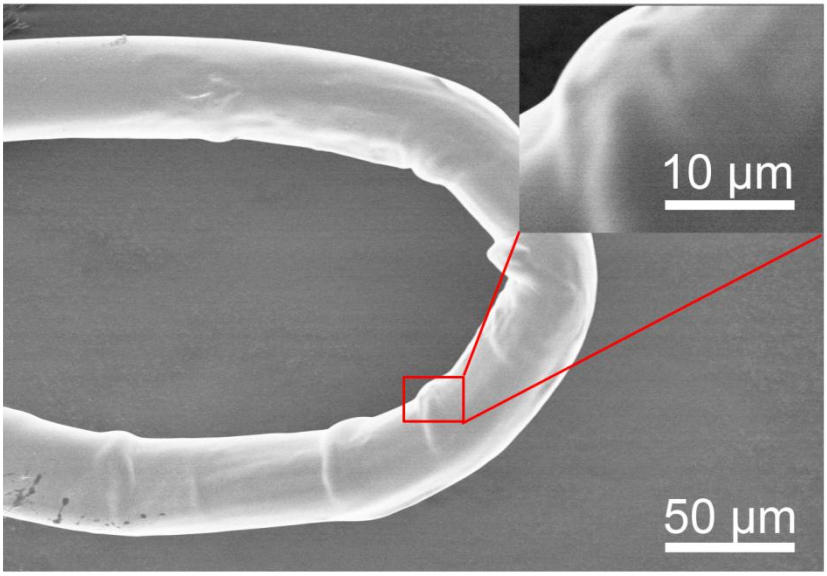

Figure S5. SEM image of a bent EDLC fiber.

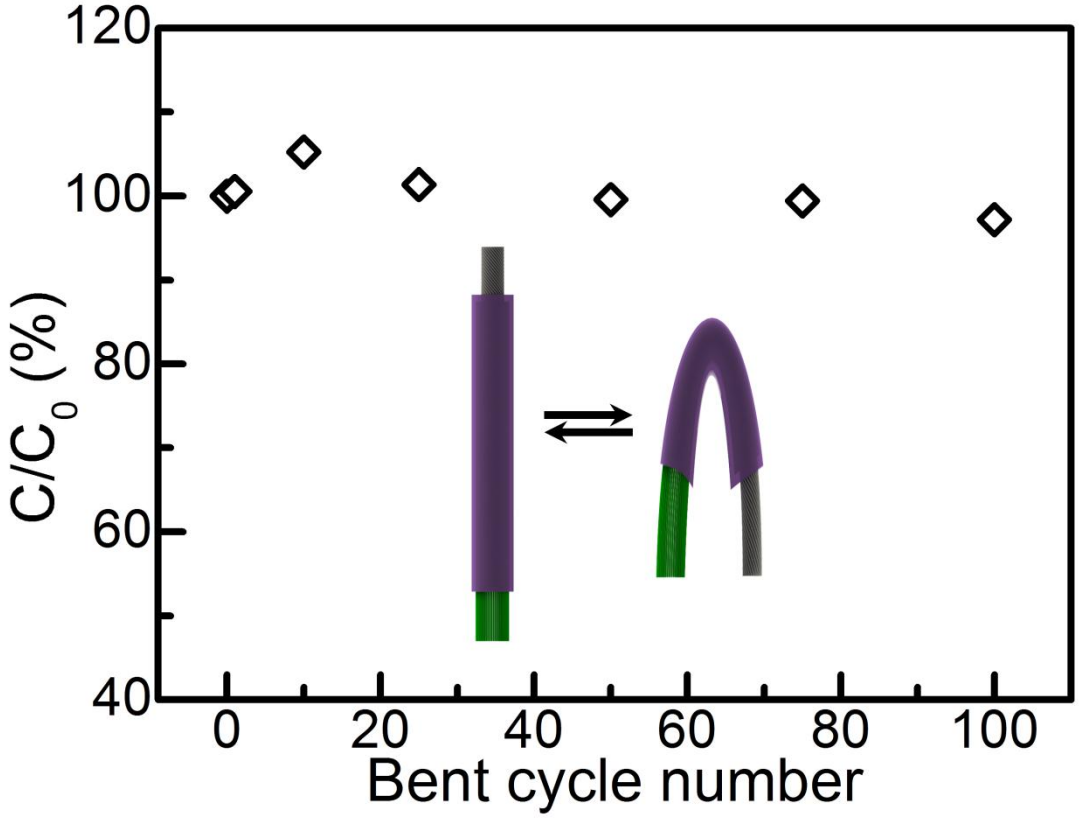

Figure S6. Dependence of specific capacitance on bent cycle number in the coaxial EDLC fiber. Here C_0 and C correspond to the capacitance before and after bending, respectively.

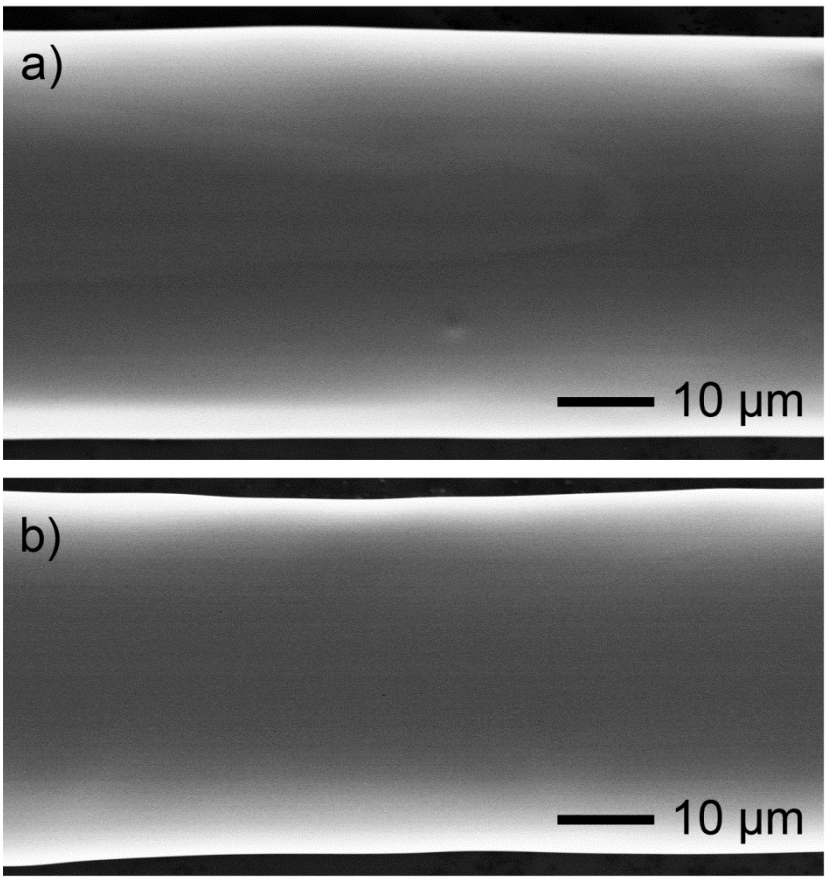

Figure S7. SEM image of a coaxial EDLC fiber (a) before and (b) after stretch.

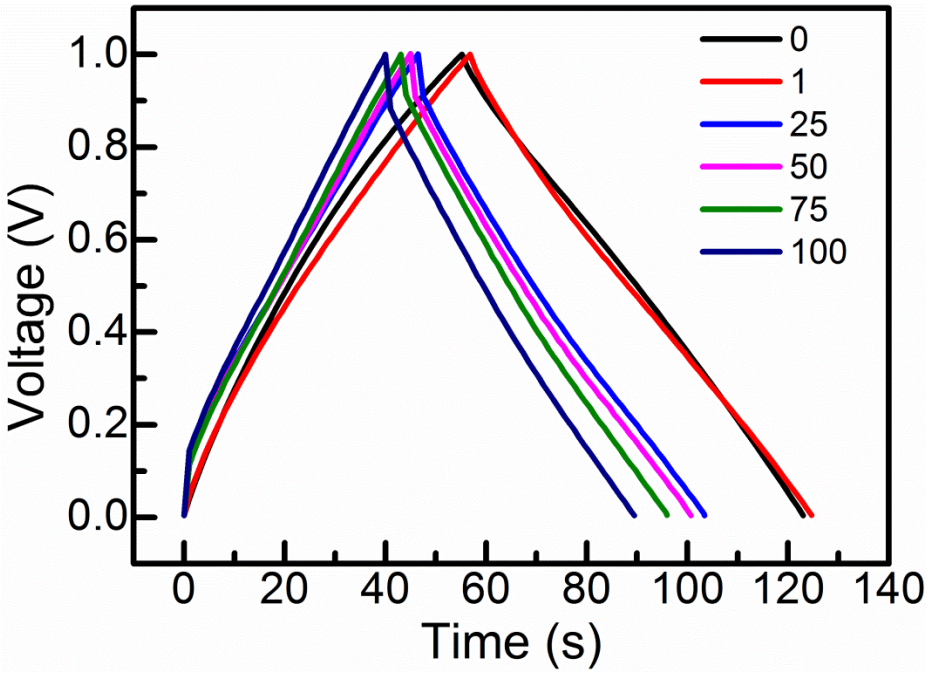

Figure S8. Typical Galvanostatic charge-discharge profiles of a coaxial EDLC fiber before and after being stretched for different cycles (strain of 10%).

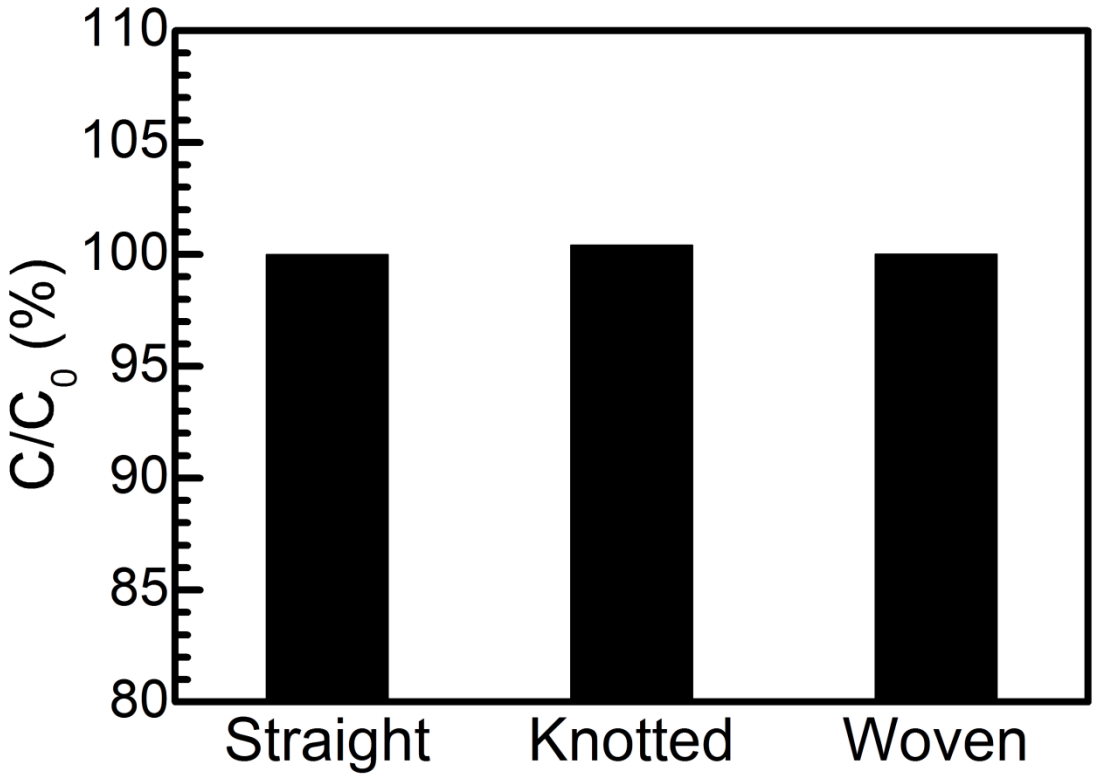

Figure S9. Specific capacitance of the EDLC fiber before and after being knotted and woven into a textile.