ADVANCED MATERIALS

Supporting Information

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Self-Powered Energy Fiber: Energy Conversion in the Sheath and Storage in the Core

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Supporting Information

Experimental section

Synthesis of spinnable CNT array. CNT arrays were synthesized by chemical vapour deposition at 740 ℃ with C_2H_4 as the carbon source and a gas mixture of Ar and H_2 as the carrier gas. The flow rates of C_2H_4, Ar and H_2 were typically 90, 400, and 30 sccm, respectively. The catalyst was composed of Fe (1.2 nm)/Al_2O_3 (3 nm)/SiO_2 (1 μm)/Si (500 μm). CNT arrays with a thickness of 230 μm were mainly used in this work.

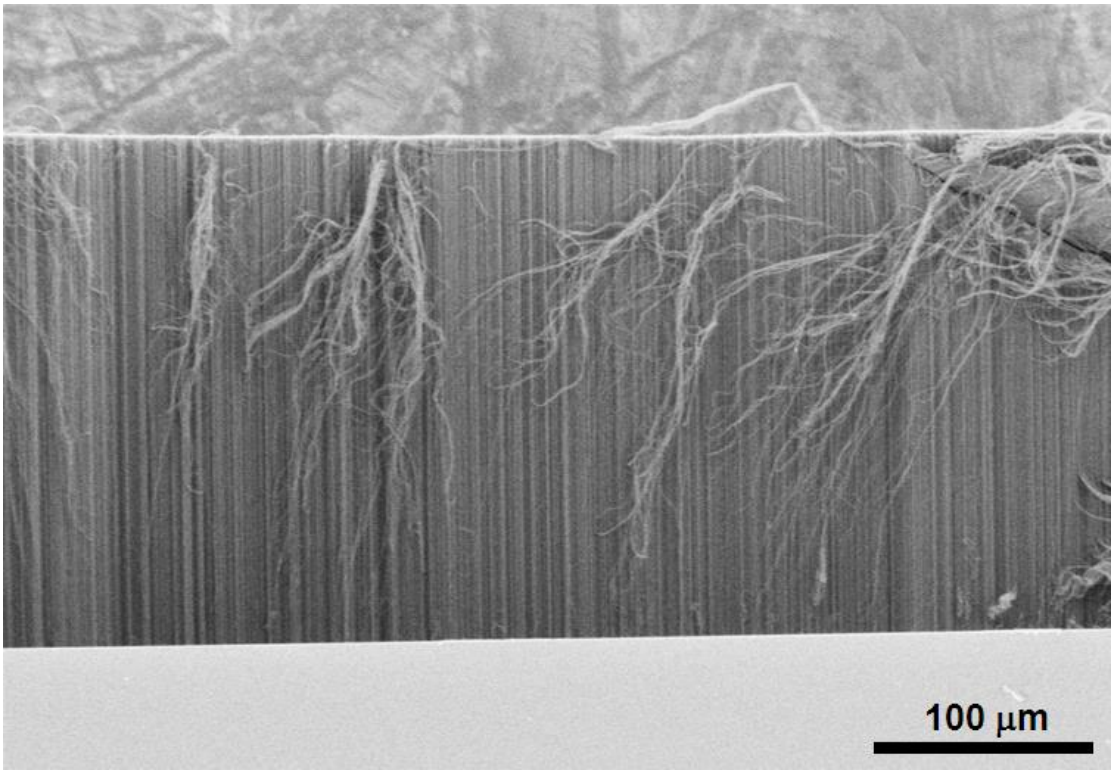

Figure S1. SEM image of a spinnable CNT array.

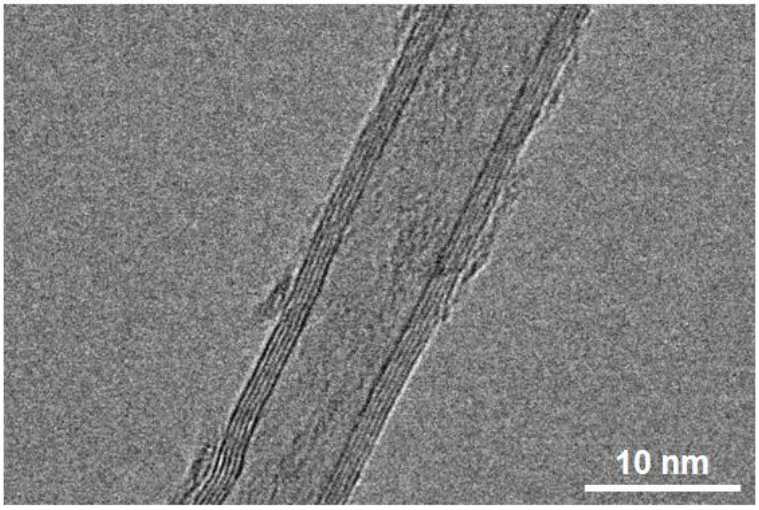

Figure S2. Transmission electron microscopy image of a CNT.

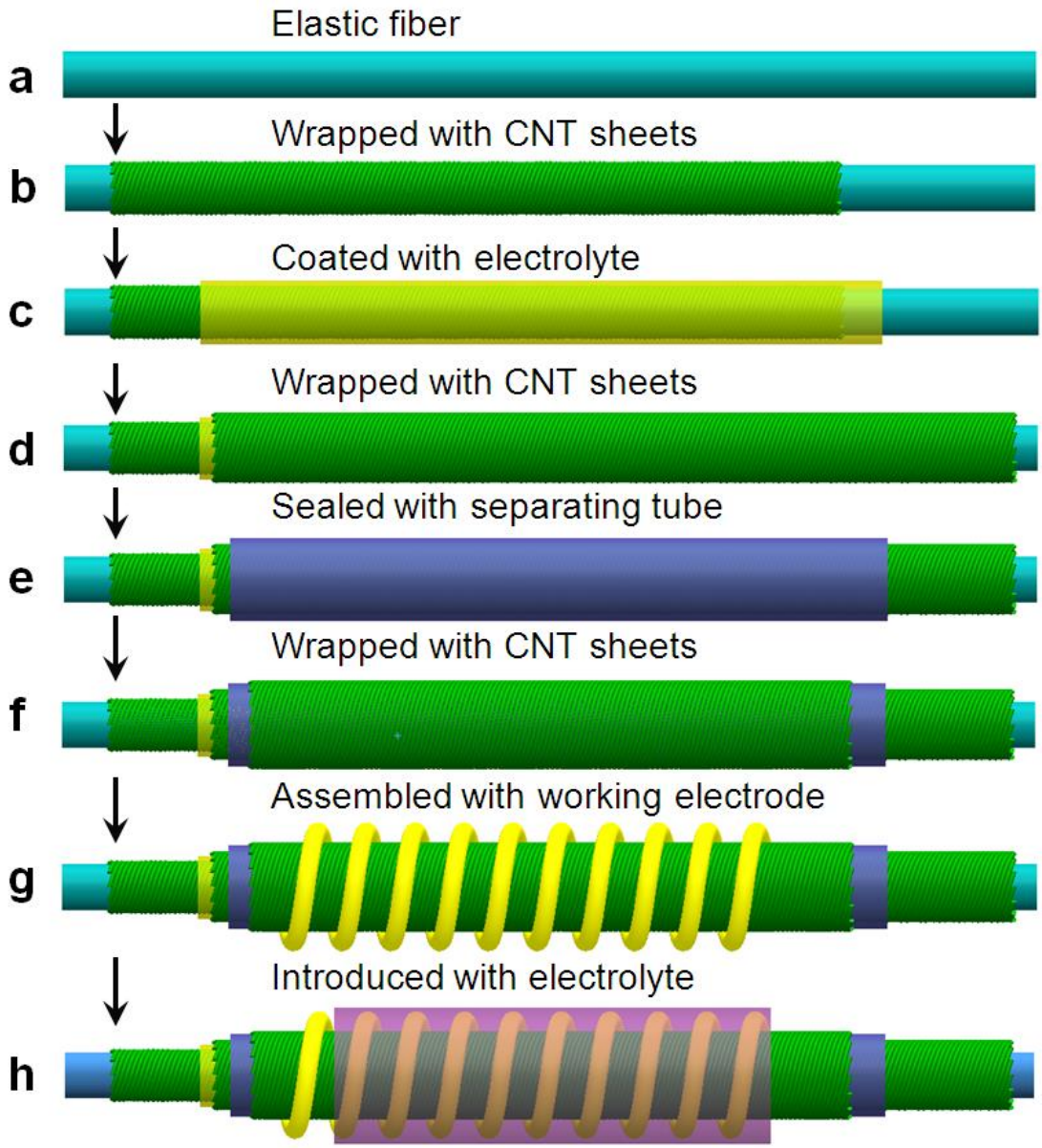

Figure S3. Schematic illustration to the fabrication of a self-powered energy fiber. The diameters of the fibers were 500, 500.7, 560, 560.66, 1200, 1201.1, 2200, 2400 μm for **a**, **b**, **c**, **d**, **e**, **f**, **g** and **h**, respectively. The diameter and pitch of the working electrode in Figure S3g were appropriately 150 and 700 μm, respectively.

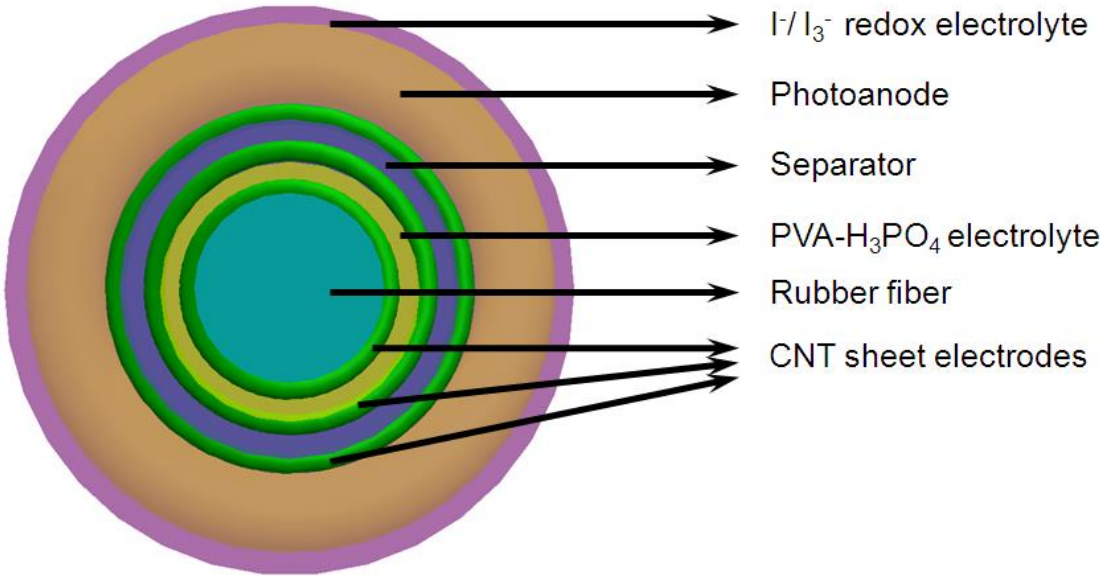

Figure S4. Schematic illustration of the cross sectional view of a self-powered energy fiber.

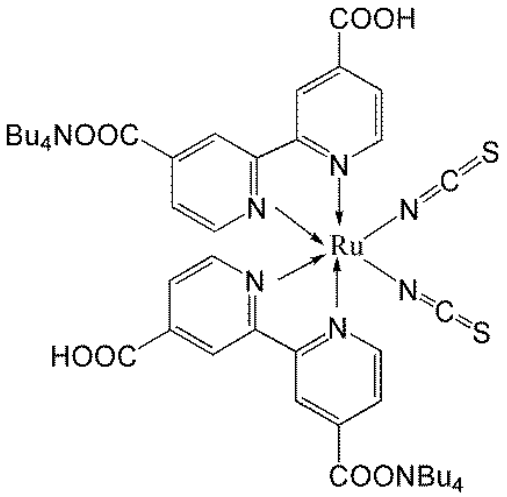

Figure S5. Chemical structure of dye molecule N719.

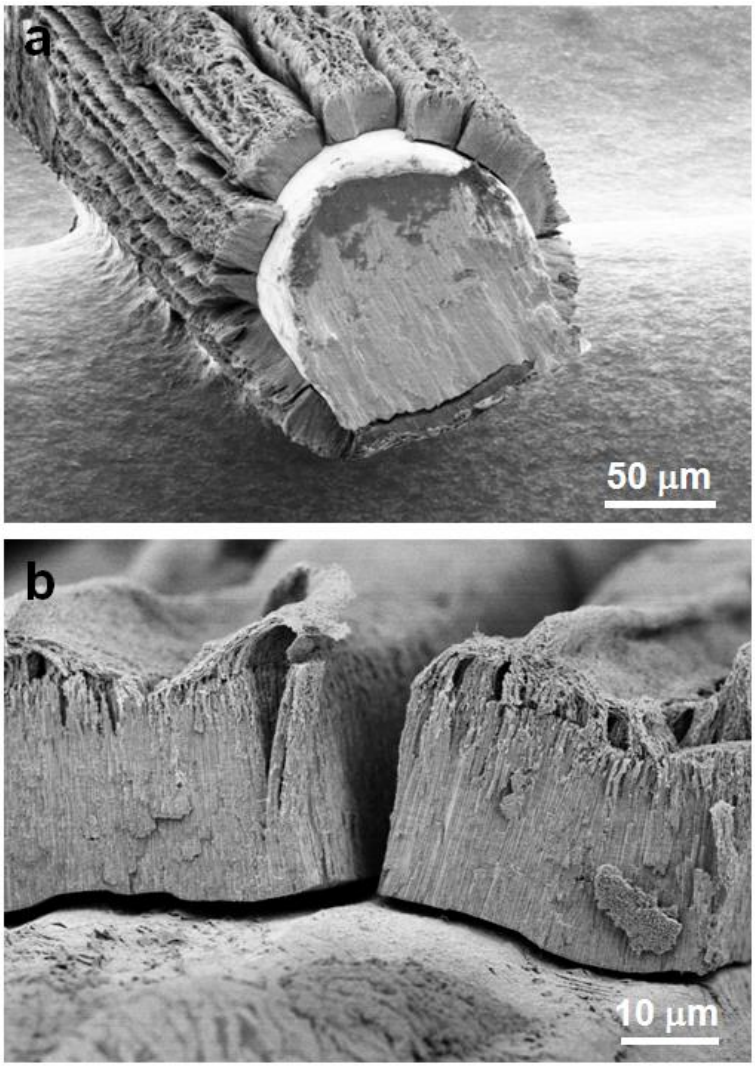

Figure S6. SEM images of the photoanode by a side view at low and high magnifications.

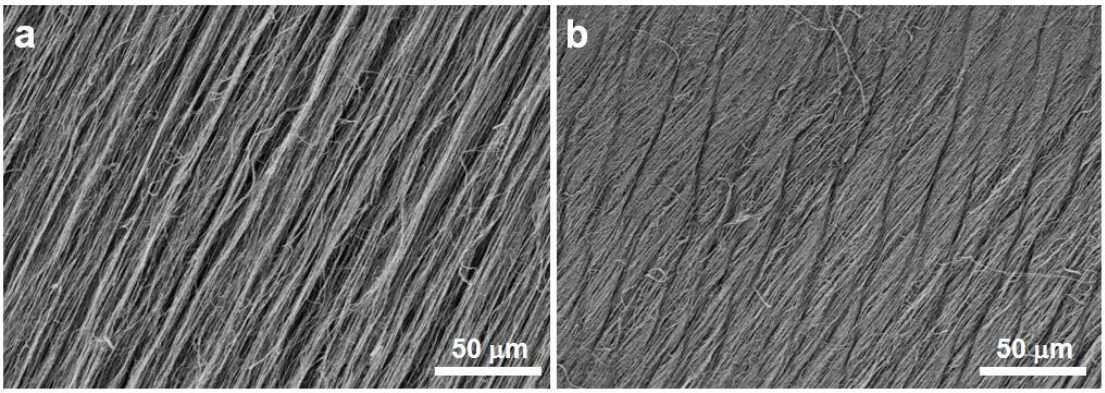

Figure S7. SEM images of the inner CNT sheet electrode before (**a**) and after (**b**) stretching with a strain of 30%**.**

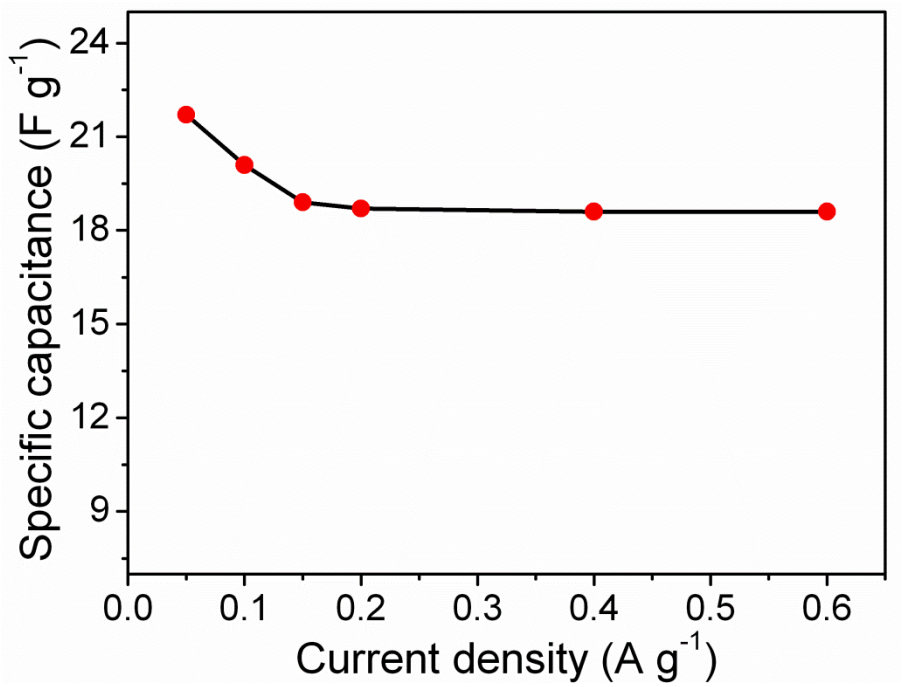

Figure S8. Dependence of specific capacitance on current density at a range from 0.05 to 0.60 A g^{-1}.

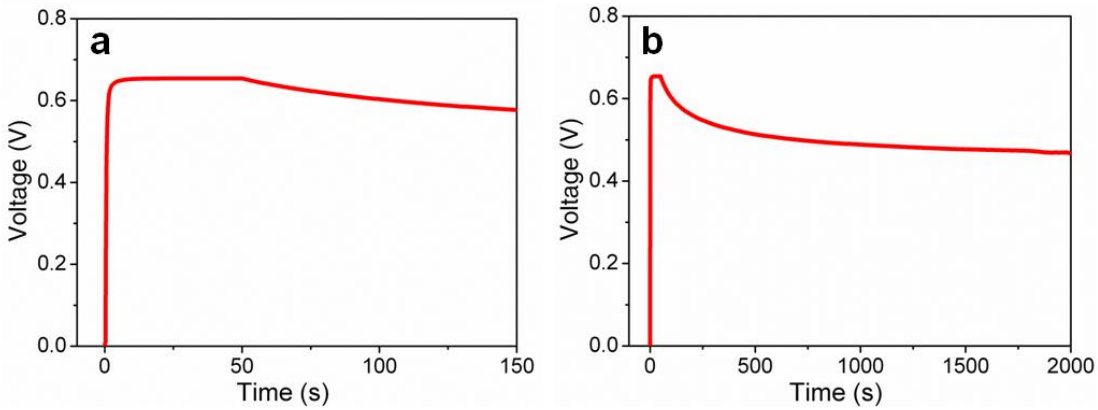

Figure S9. The self-discharge curve of the energy fiber after being fully photocharged. **a.** Self-discharge time of 100 s. **b.** Self-discharge time of 2000 s.

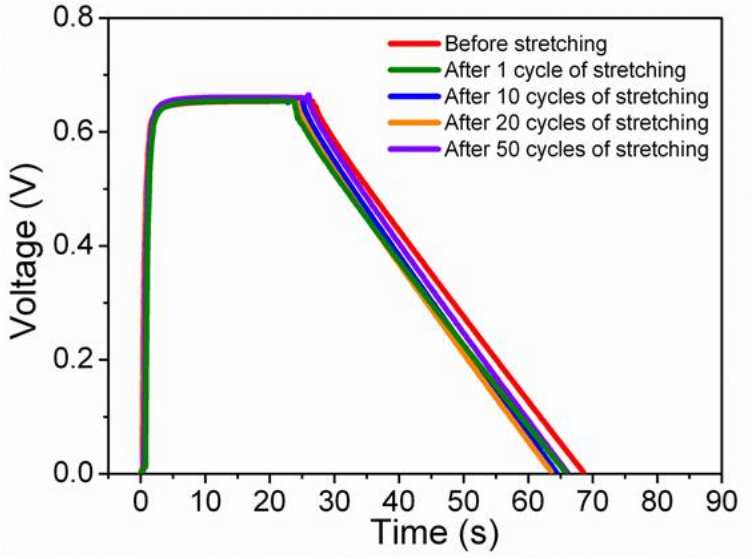

Figure S10. Photocharge and discharge processes before and after stretching for 1, 10, 20 and 50 cycles with the same strain of 20%. The galvanostatic discharging process was performed by an electrochemical station at a current density of 0.1 A g^{-1}.

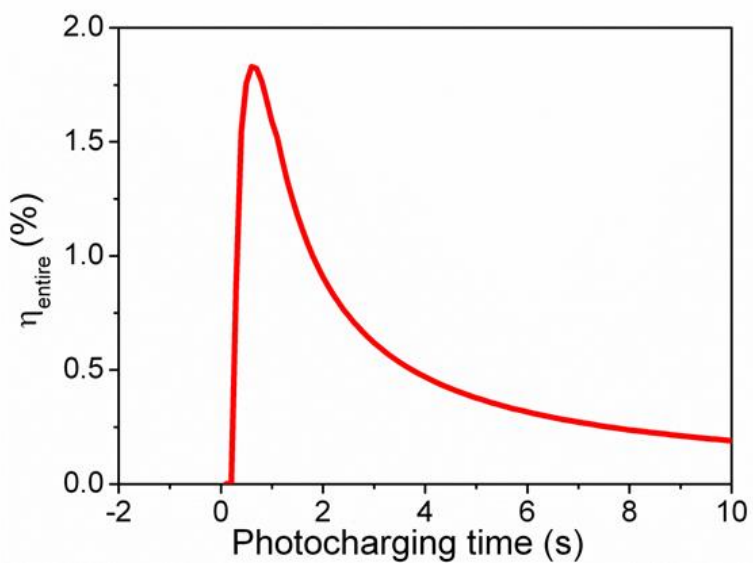

Figure S11. Dependence of the entire energy conversion and storage efficiency on photocharging time.