

Electronic Supplementary Information (ESI)

Scalable Fabrication of Free-Standing, Stretchable CNTs/TPE Ultrathin Composite Film for Skin Adhesive Epidermal Electronics

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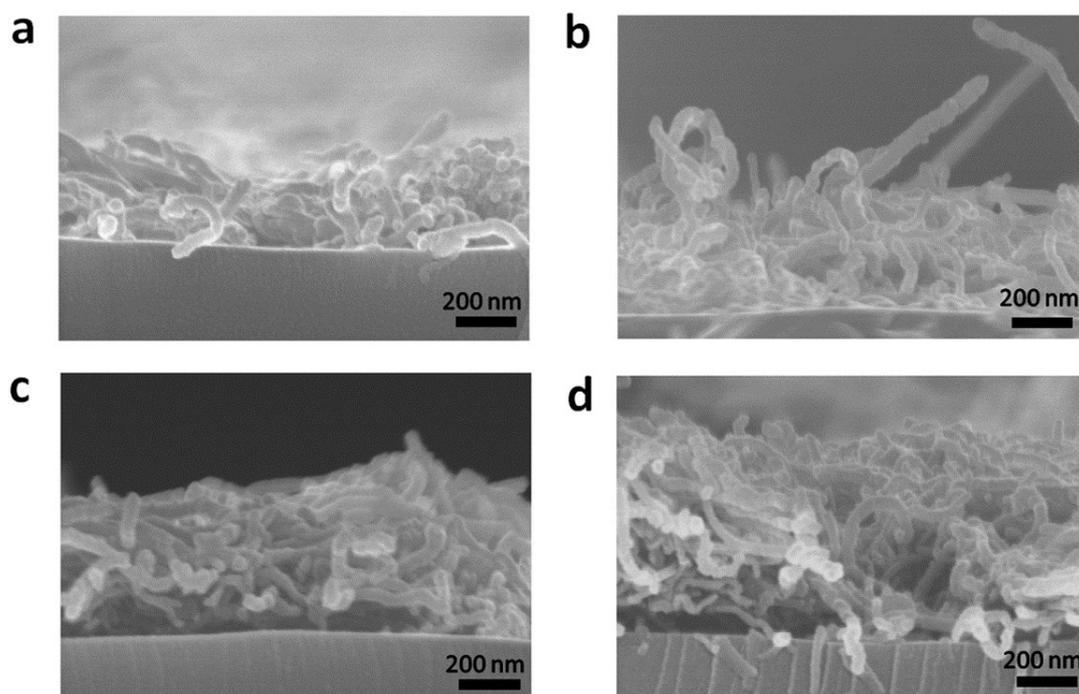


Fig. S1 The cross section SEM images of CNTs film with different thickness, which prepared by different concentration of CNTs dispersion. a) The CNTs film was prepared by 0.1 mg/mL CNTs dispersion and the thickness is about 250 nm. Scale bar, 200 nm. b) The CNTs film was prepared by 0.2 mg/mL CNTs dispersion and the thickness is about 400 nm. Scale bar, 200 nm. c) The CNTs film was prepared by 0.3 mg/mL CNTs dispersion and the thickness is about 500 nm. Scale bar, 200 nm. d) The CNTs film was prepared by 0.5 mg/mL CNTs dispersion and the thickness is about 700 nm. Scale bar, 200 nm.

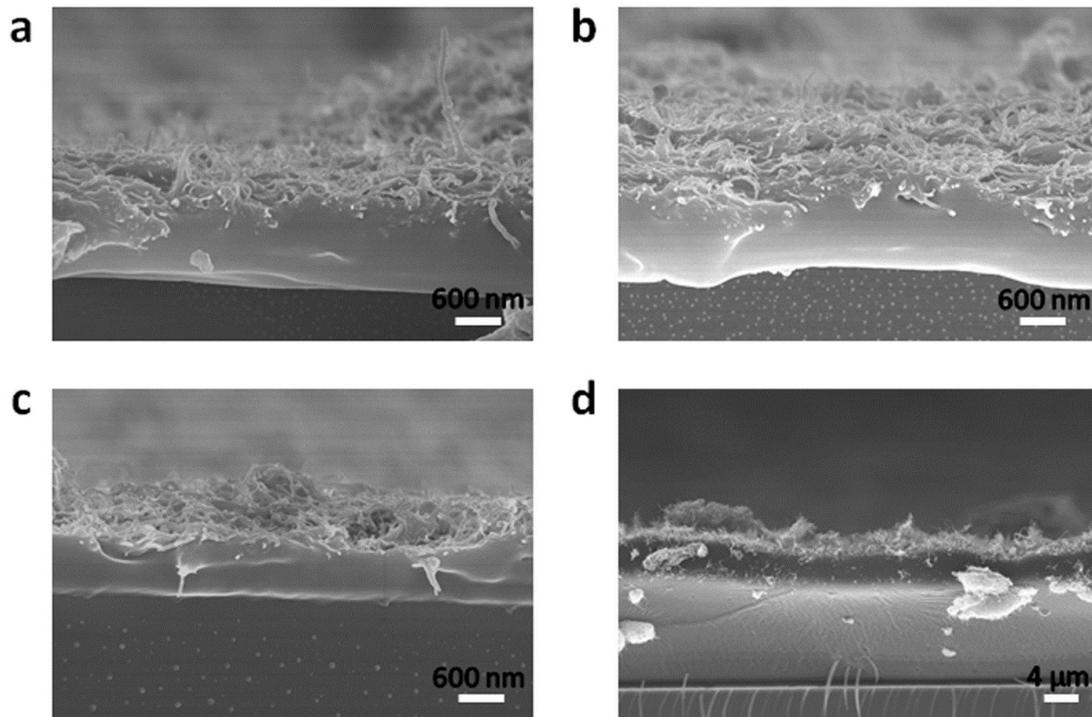


Fig. S2 The cross section SEM images of CNTs/TPE hybrid film of different CNTs thickness and hybrid film thickness, which prepared by different concentration of CNTs dispersions and TPE solutions, respectively. a) The thickness of the hybrid film is about 1.8 μm , which was prepared by 0.1 mg/mL CNTs dispersion and 2 mg/mL TPE solution, respectively. Scale bar, 600 nm. b) The thickness of the hybrid film is about 2 μm , which was prepared by 0.2 mg/mL CNTs dispersion and 2 mg/mL TPE solution, respectively. Scale bar, 600 nm. c) The thickness of the hybrid film is about 1.5 μm , which was prepared by 0.3 mg/mL CNTs dispersion and 2 mg/mL TPE solution, respectively. Scale bar, 600 nm. d) The thickness of the hybrid film is about 18 μm , which was prepared by 0.5 mg/mL CNTs dispersion and 10 mg/mL TPE solution, respectively. Scale bar, 4 μm .

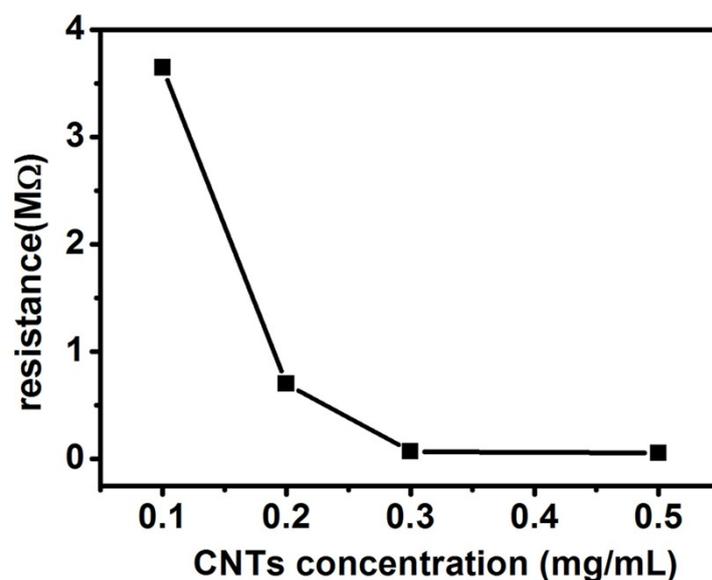


Fig. S3 The resistance of the CNTs/TPE hybrid film strips (with a size of 25 mm \times 3 mm ($L_0 \times W_0$)) that was

prepared by with different CNTs concentrations and 2 mg/mL TPE solution, respectively.

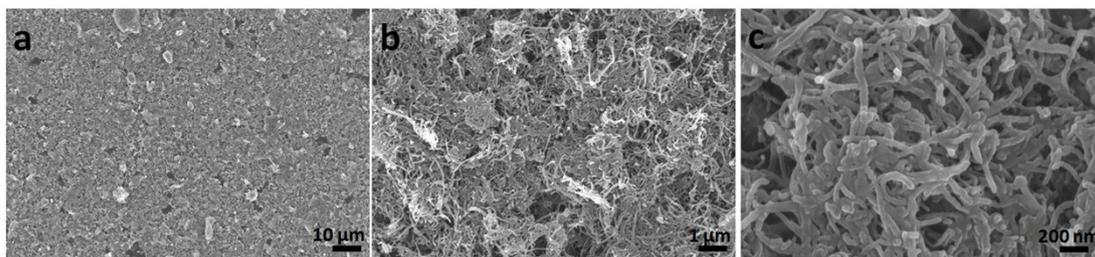


Fig. S4 The different magnifications SEM images of the CNTs/TPE hybrid film at water side after the durability test.

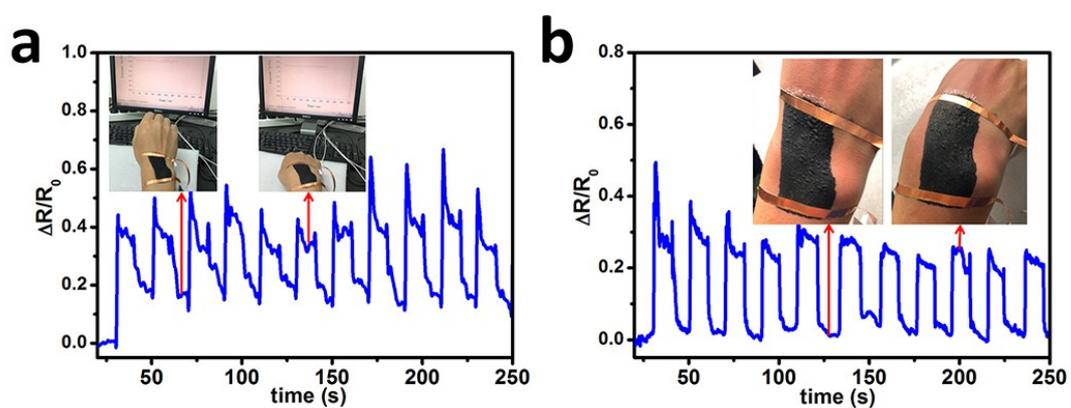


Fig. S5 R/R_0 versus time curve of the wrist bending and releasing behaviour under the no sweating condition (a) and perspiring condition (b). Inset: photo of CNTs/TPE film attached to the wrist.

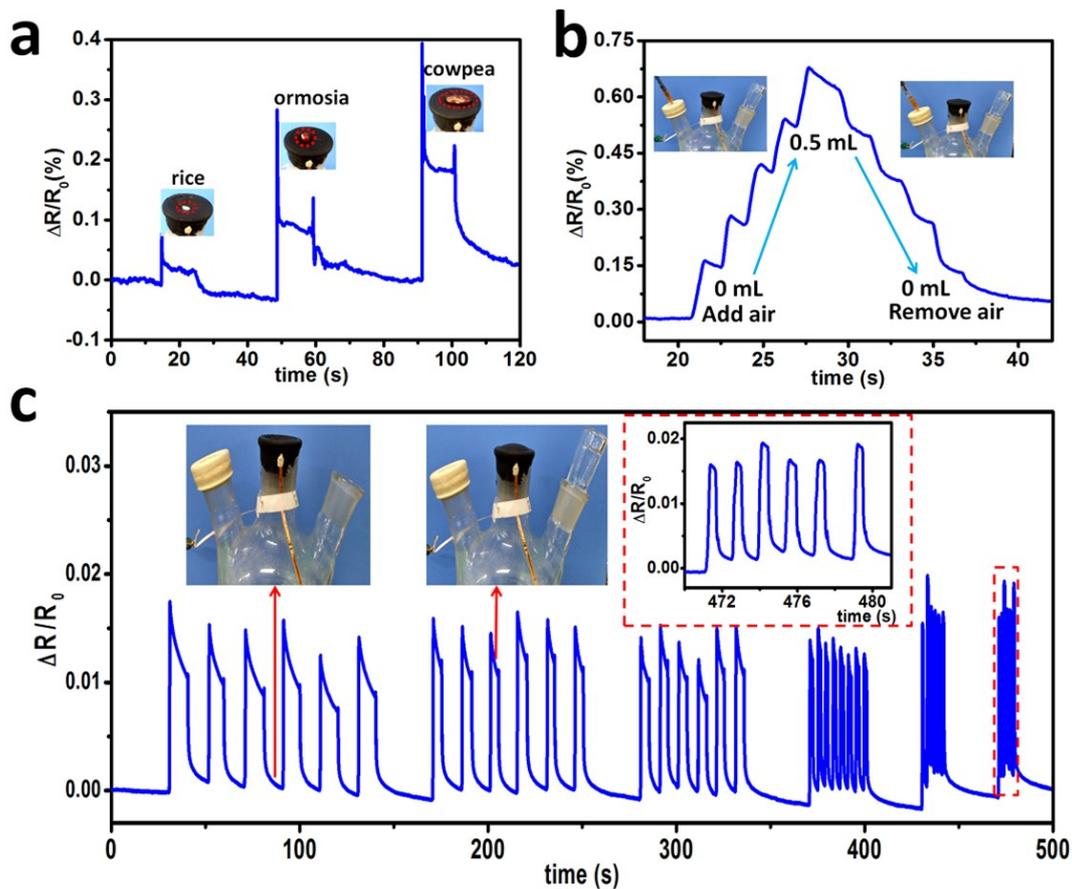


Fig. S6 a) $\Delta R/R_0$ versus time curve of test the different objects (rice (24.5 mg), ormosia (222.5 mg) and cowpea (497 mg)). b) $\Delta R/R_0$ versus time curve with a real-time detection air content change. c) $\Delta R/R_0$ versus time curve of repetitive stretching by gas expansion through repeat covering the stopper and removing the stopper at different frequencies.

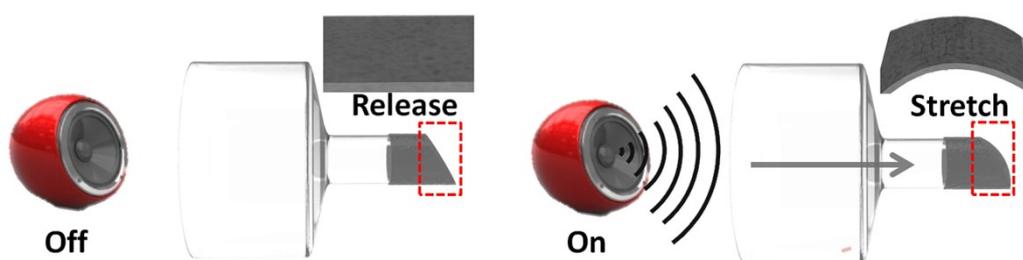


Fig. S7 The schematic of the film to monitor the acoustic signal.

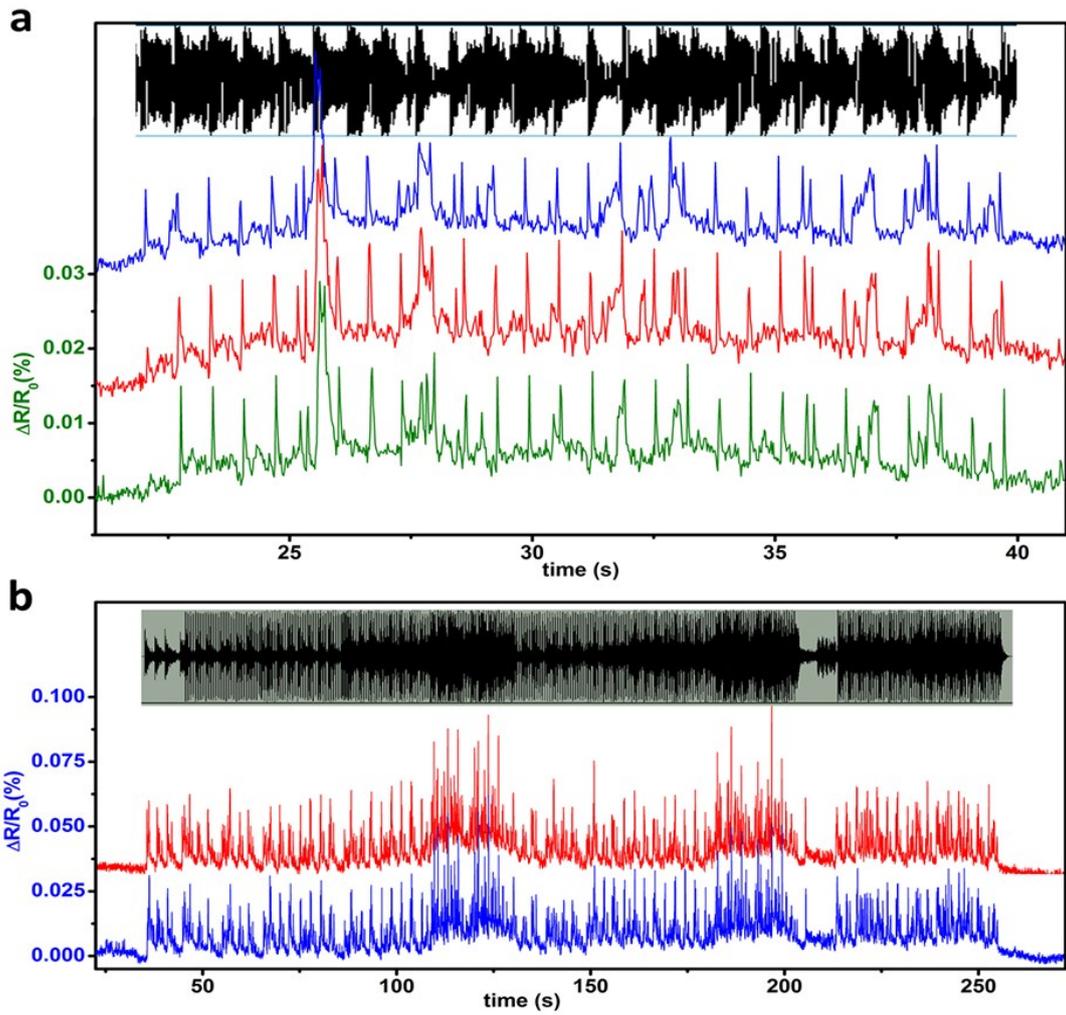


Fig. S8 Real-time monitoring of the acoustic signal by a loudspeaker. a) The ringtones version of the song “diamonds” was used three times. b) The full version accompaniment of the song “diamonds” (from 14s to 238s) was used two times.