



Article

Thermally drawn CNT-based hybrid nanocomposite fiber for electrochemical sensing

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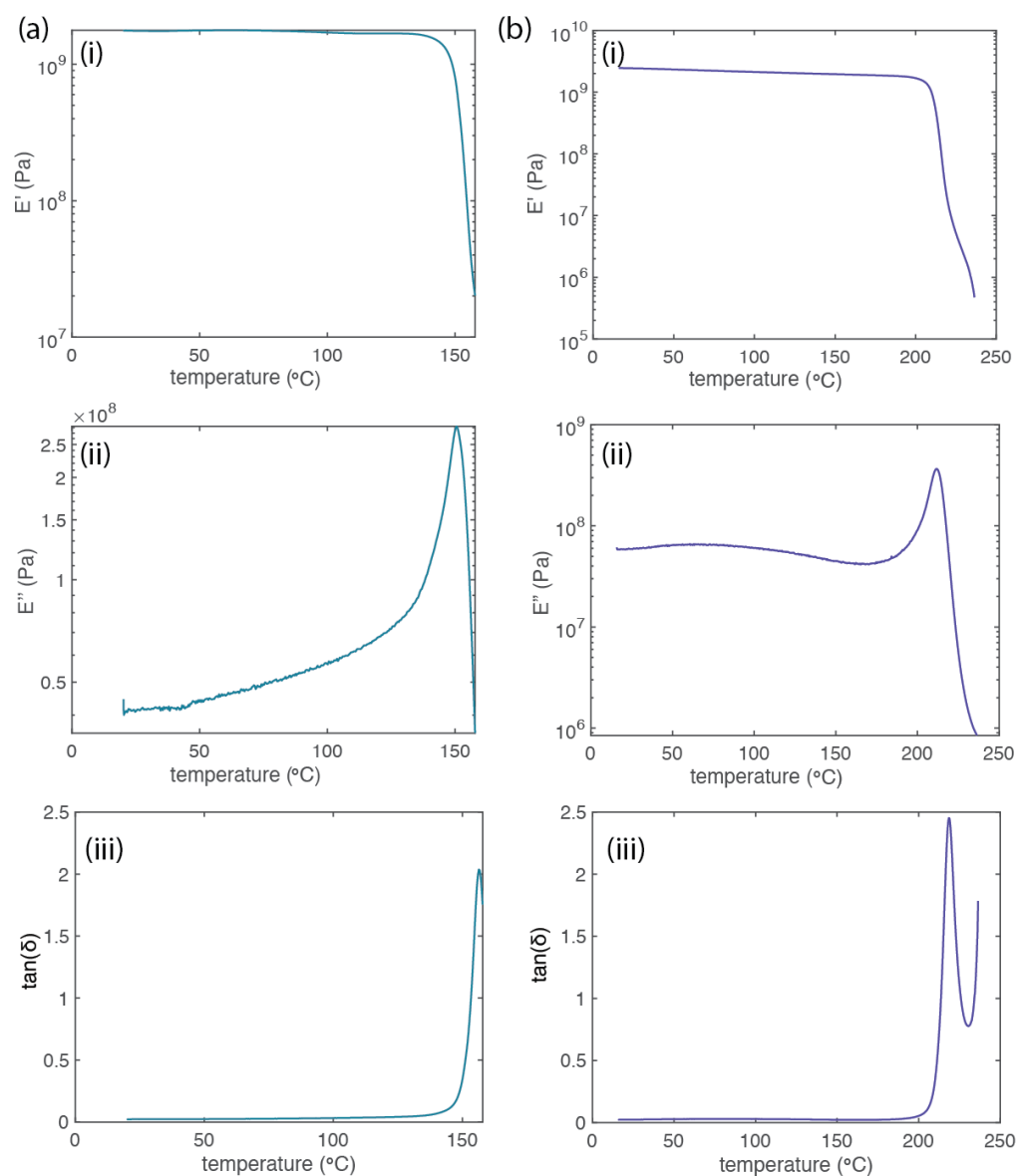
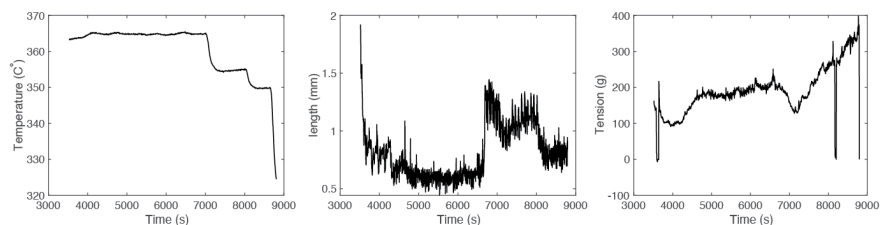
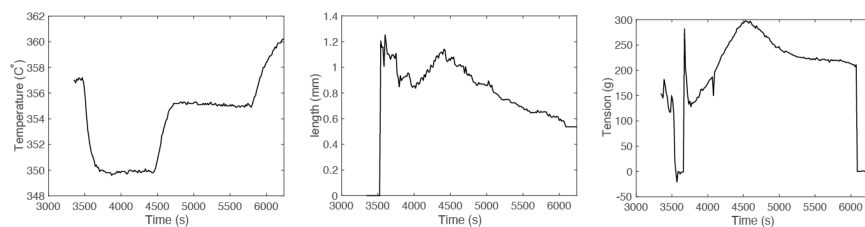


Figure S1. The DMA analysis of polymer - polycarbonate (PC) and polyetherimide (PEI). **a.** The storage modulus, the loss modulus and $\tan(\delta)$ of the PC from 20°C to 160°C. **b.** The storage modulus, the loss modulus and $\tan(\delta)$ of the PEI from 20°C to 240°C. We identified that PC is compatible with nanocomposites with CNT loadings up to 5 wt% and PEI is compatible with nanocomposites with CNT loadings up to 10 wt%.

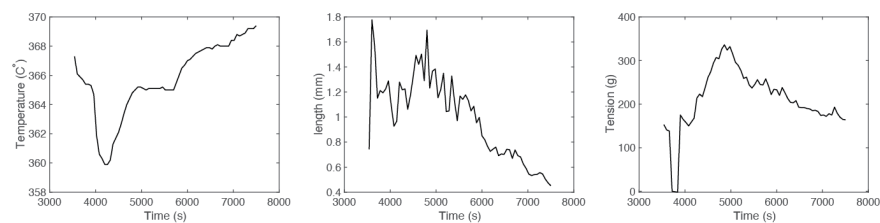
(a) PEI with 0 wt% CNT composite



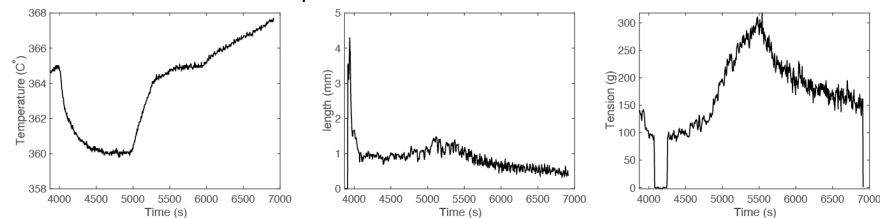
(b) PEI with 3.8 wt% CNT composite



(c) PEI with 5.0 wt% CNT composite



(d) PEI with 7.5 wt% CNT composite



(e) PEI with 10 wt% CNT composite

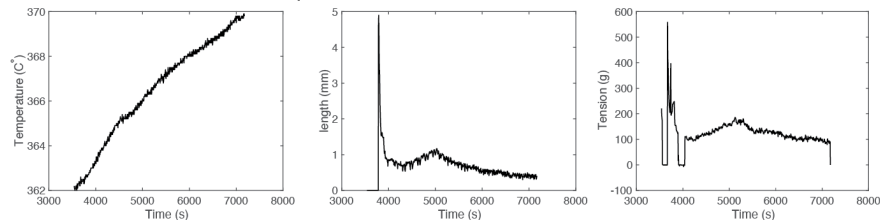


Figure S2. The thermal drawing parameters of the CNT composite fibers with different loadings based on the PEI as claddings. **a.** The drawing temperature, the long side of the cross-sectional length and the tension during the process of drawing PEI with 0 wt% loading of composites and with 3.8 wt, 5.0 wt, 7.5 wt and 10 wt % of CNT nanocomposites in **b-e**, respectively.

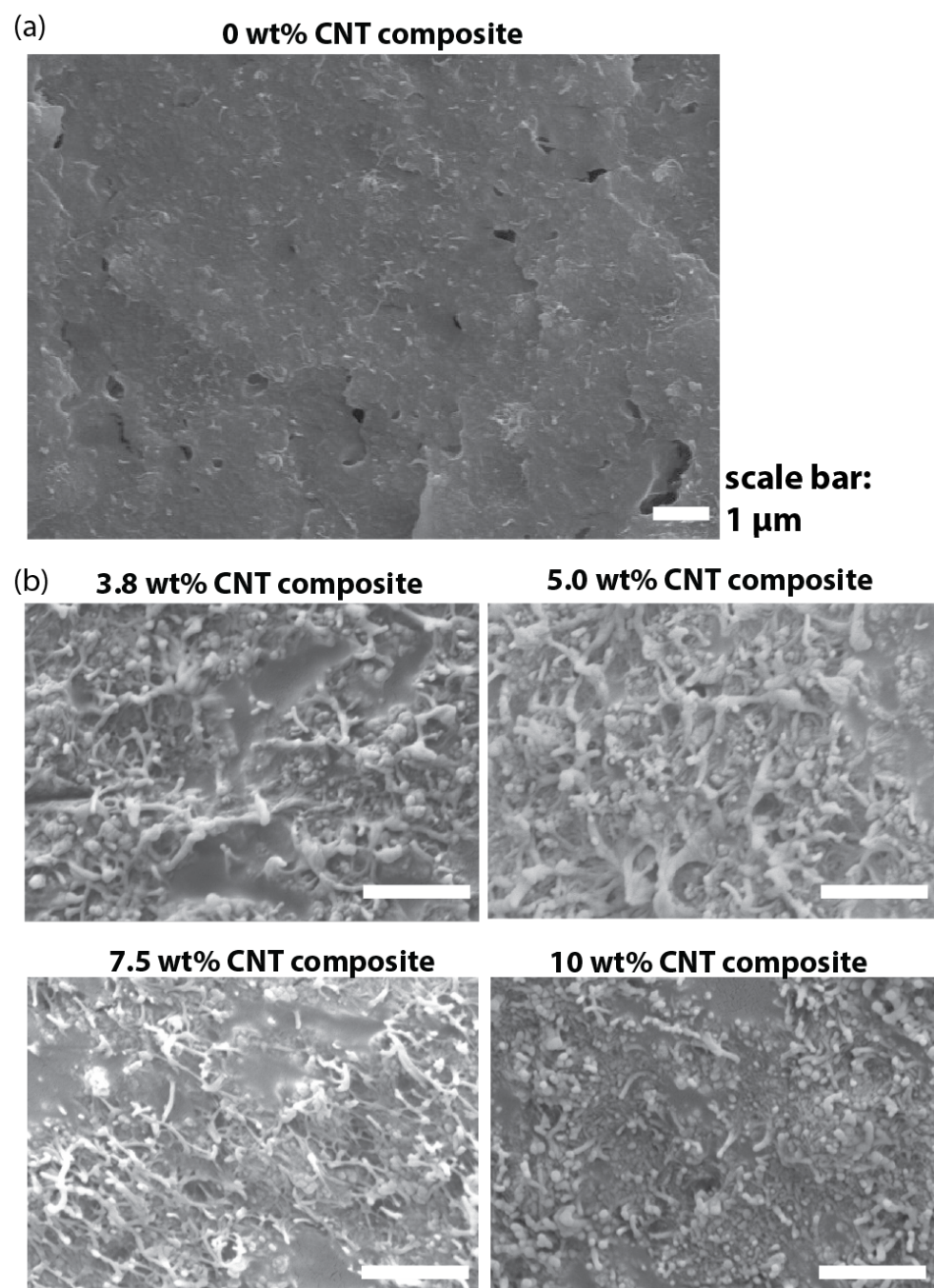


Figure S3. The scanning electron microscope (SEM) analysis of the morphology and composition of the nanocomposites. **a.** The SEM of the nanocomposite without CNT loadings. **b.** The detailed SEM of the nanocomposites with 3.8 wt, 5.0 wt, 7.5 wt and 10 wt % loading of CNTs.

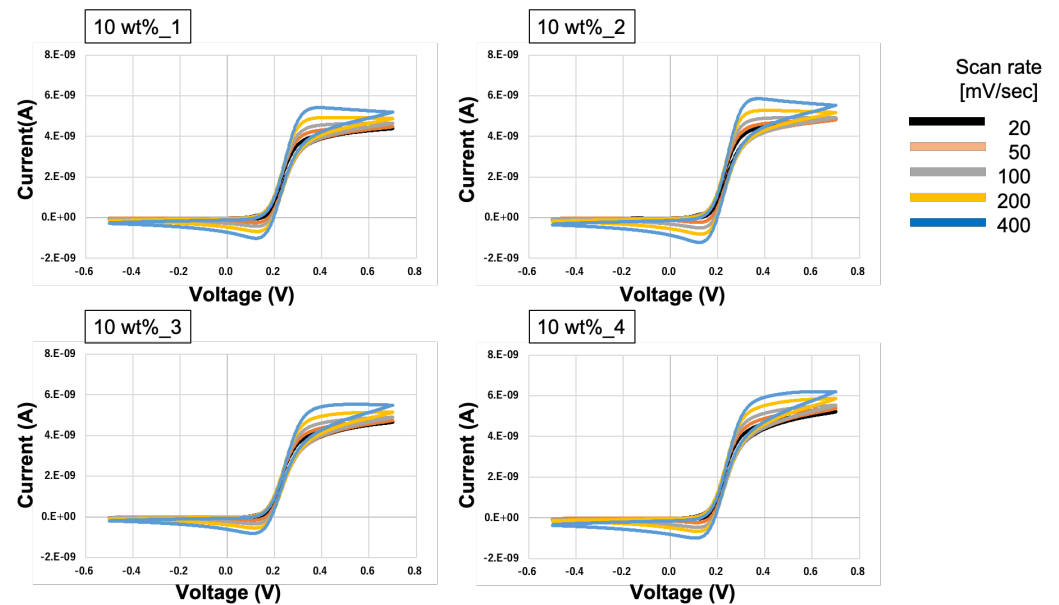


Figure S4. The cyclic voltammograms of the fiber sensors with 10 wt% CNT nanocomposites. (N=4) The data were obtained across 4 different samples and the scanning rate varied from 20 mV/s to 400 mV/s.

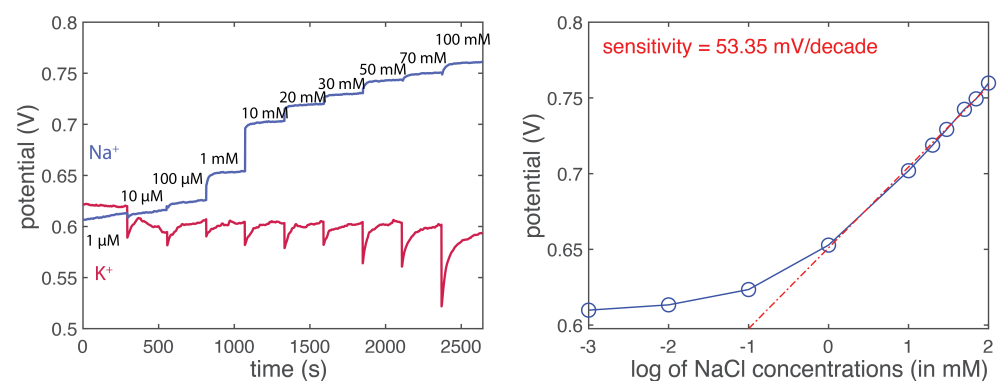


Figure S5. The Na^+ sensing characterization of the ion-sensitive membrane functionalized CNT composite fibers in the physiological range. **a.** The continuous measurement of the ISM-functionalized fibers to Na^+ ions and its selective response to the K^+ ions. **b.** The sensitivity calculation of the Na^+ ion response, which exhibits a linearity from 1 mM with sensitivity of 53.35 mV/decades.