Electronic Supplementary Material

Improved conductivity and capacitance of interdigital carbon microelectrodes through integration with carbon nanotubes for micro-supercapacitors

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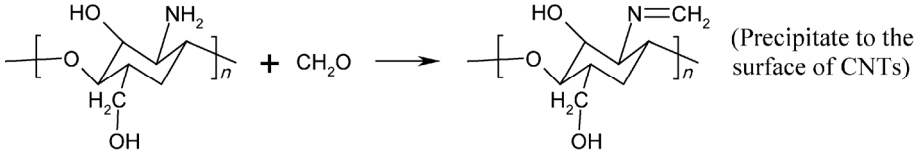

Figure S1 Synthetic scheme for modification of CNTs by chitosan.

After chitosan reacts with formaldehyde, its solubility in water decreases. Thus, modified chitosan will gradually precipitate onto the surface of CNTs. This surface improvement will endow good dispensability of CNTs in the photoresist.

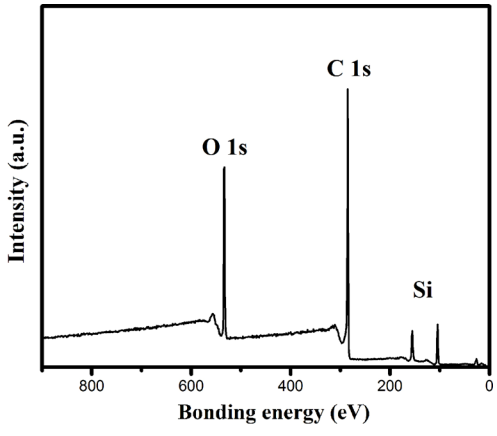

Figure S2 XPS survey spectrum of pyrolyzed carbon microelectrodes after pyrolysis at 900 ˚C.

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Calculations of electrochemical performance

The specific capacitance of the prepared micro-supercapacitors is calculated by following equation (Eq. (S1)) [S1]

$$C_{\text{area}} = \frac{\int I(V)\mathrm{d}V}{2As\Delta V} \tag{S1}$$

where C_{area} is specific capacitance, $\int I(V)dV$ is the integral area of CV curve, A is the area of electrode materials, s is potential scan rate, and ΔV is voltage window width.

The volumetric energy and power density of the prepared micro-supercapacitors are calculated by following equations (Eqs. (S2) and (S3)) [S2]

$$E = \frac{C_{\text{area}} V^2}{7200t} \tag{S2}$$

$$P = \frac{E}{\Delta t} \times 3600 \tag{S3}$$

where E is the energy density, P is the power density, C_{area} is the specific capacitance calculated through CVs, V is voltage window width, t is the thickness of micro-supercapacitor, Δt is the discharge time.

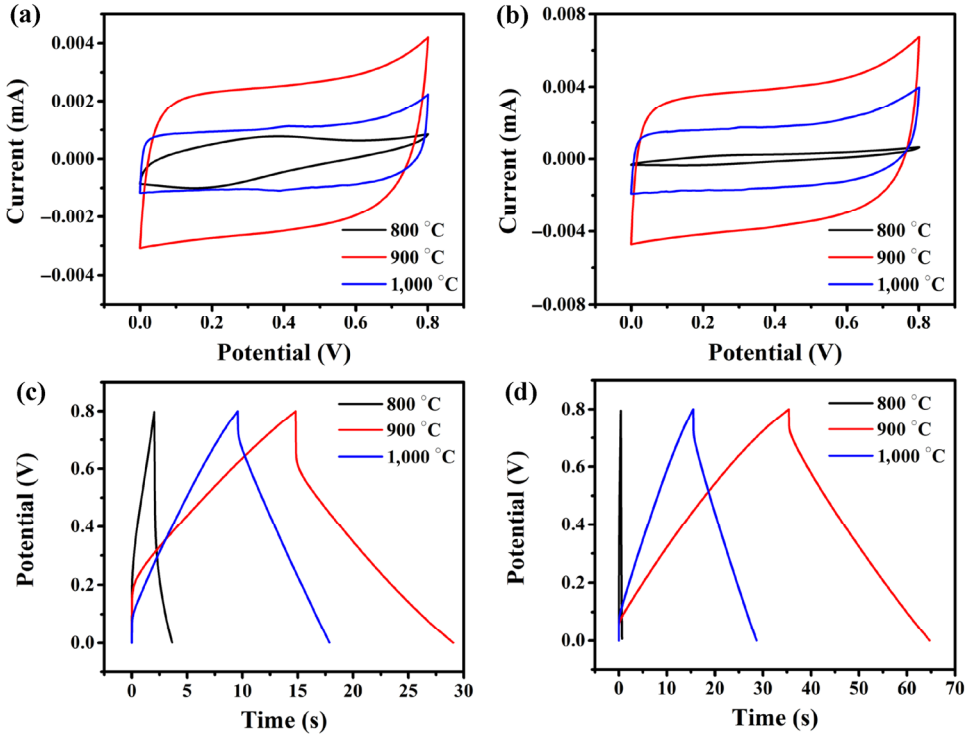

Figure S3 (a) and (b) CV curves of (a) pure C and (b) C/pristine CNTs micro-supercapacitor at scan rate of 10 mV·s^{-1}. (c) and (d) Galvanostatic charge–discharge profile of (c) pure C and (d) C/pristine CNTs micro-supercapacitor at current density of 0.1 mA·cm^{-2}.

References

[S1] Beidaghi, M.; Wang, C. L. Micro-supercapacitors based on three dimensional interdigital polypyrrole/C-MEMS electrodes. *Electrochim. Acta* **2011**, *56*, 9508–9514.

[S2] Tian, X. C.; Shi, M. Z.; Xu, X.; Yan, M. Y.; Xu, L.; Minhas-Khan, A.; Han, C. H.; He, L.; Mai, L. Q. Arbitrary shape engineerable spiral micropseudocapacitors with ultrahigh energy and power densities. *Adv. Mater.* **2015**, *27*, 7476–7482.