Construction of Microfluidic-Oriented Polyaniline Nanorod arrays

/Graphene Composite Fibers towards Wearable Micro-

Supercapacitors

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Supplementary Table S1. EIS molding data. Parameter values from curve-fitting of the impedance results shown in Figure 3e by using the equivalent circuit described in Figure S7.

<table>
<thead>
<tr>
<th></th>
<th>$R_0/\Omega$</th>
<th>$C_1/\mu F$ s$^{n_1-1}$</th>
<th>$n_1$</th>
<th>$R_1/\Omega$</th>
<th>$Z_w/\Omega$</th>
<th>$C_2/\mu F$</th>
<th>$n_2$</th>
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<tr>
<td>G fiber</td>
<td>286.6</td>
<td>0.18xe$^{-3}$</td>
<td>0.89</td>
<td>14.5</td>
<td>5.3</td>
<td>1.6</td>
<td>0.90</td>
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<tr>
<td>PNA/G fiber</td>
<td>263.7</td>
<td>0.23xe$^{-3}$</td>
<td>0.82</td>
<td>9.8</td>
<td>9.5</td>
<td>4.5</td>
<td>0.91</td>
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Supplementary Table S2. The energy densities of different fibers based micro-supercapacitors.

<table>
<thead>
<tr>
<th>Electrode material</th>
<th>Energy density ($\mu Wh \ cm^{-2}$)</th>
<th>References</th>
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<tr>
<td>1 RGO</td>
<td>0.17</td>
<td>1</td>
</tr>
<tr>
<td>2 Ni@MnO$_2$</td>
<td>1.04</td>
<td>2</td>
</tr>
<tr>
<td>3 CNT@Co$_3$O$_4$</td>
<td>1.2</td>
<td>3</td>
</tr>
<tr>
<td>4 N-doped CNT</td>
<td>1.3</td>
<td>4</td>
</tr>
<tr>
<td>5 RGO+CNT</td>
<td>3.84</td>
<td>5</td>
</tr>
<tr>
<td>6 G/PPy</td>
<td>9.7</td>
<td>6</td>
</tr>
<tr>
<td>7 GCP-35@CMC</td>
<td>14.5</td>
<td>7</td>
</tr>
<tr>
<td>8 Our work</td>
<td>37.2</td>
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Fig. S1. Electrochemical performance testing in a three-electrode system in 1M H$_3$PO$_4$ aqueous solution. a) Photo of three-electrode system. The insert is schematic illustration of three-electrode system. b) CV curves of G and PNA/G fibers under the scan rates 50 mV s$^{-1}$. c) Charge–discharge curves of G and PNA/G fibers at current density of 0.1 mA cm$^{-2}$. d) The areal capacitance comparison diagram between G fiber and PNA/G fiber.

Fig. S2. Cyclic voltammetry of pure graphene fiber at different scan rates in H$_3$PO$_4$/PVA gel electrolyte.
Fig. S3. Cyclic voltammetry of PNA/G composite fiber at different scan rates in H$_3$PO$_4$/PVA gel electrolyte.

Fig. S4. The surface SEM images of PNA/G fiber at different polymerization times and the specific capacitances of PNA/G fiber in H$_3$PO$_4$/PVA gel electrolyte at different PNA contents after different polymerization times.

Fig. S5. Charge-discharge curves of pure graphene fiber at different current densities in H$_3$PO$_4$/PVA gel electrolyte.
Fig. S6. Charge-discharge curves of PNA/G composite fiber at different current densities in H₃PO₄/PVA gel electrolyte.

Fig. S7. The equivalent circuit model of micro-supercapacitors.

Fig. S8. Cyclic voltammetry of pure graphene fiber at different scan rates in EMITFSI/PVDF-HFP gel electrolyte.
Fig. S9. Cyclic voltammetry of PNA/G composite fiber at different scan rates in EMITFSI/PVDF-HFP gel electrolyte.

Fig. S10. Charge-discharge curves of pure graphene fiber at different current densities in EMITFSI/PVDF-HFP gel electrolyte.

Fig. S11. Charge-discharge curves of PNA/G composite fiber at different current densities in EMITFSI/PVDF-HFP gel electrolyte.
Fig. S12. Energy density versus power density of micro-SCs

Fig. S13. Photographs of two micro-SCs assembled in parallel to power smart watch. The inset is the back of device.

Fig. S14. Photographs of four micro-SCs woven into cloth to light up 13 constructed LEDs “123” logo. The inset is the back of device.
Fig. S15. Photographs of four micro-SCs assembled in parallel to power 19 LEDs constructed “FSSC” logo. The inset is the back of device.

Fig. S16. Photographs of five micro-SCs integrated on polyethylene terephthalate (PET) substrate to drive large-scale monochrome display. The inset is the back of device.

Notes and references