Wireless Piezoelectric Device Based on Electrospun PVDF/BaTiO$_3$ NW Nanocomposite Fibers for Human Motion Monitoring

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Fig. S1 Schematic of the apparatus for electrospinning

Fig. S2 Bar chart of the fiber size distributions of (a) pure PVDF fibers and (b) PVDF/BaTiO$_3$ NWs nanocomposite fibers.
Fig. S3 Relationship between the output current and the content of BaTiO$_3$ NWs in the electrospun fibers. (The impact force is of 9 N and frequency of 3.5 Hz).
Fig. S4 Influence of impact frequency on the voltage of the as-spun fibers containing BaTiO$_3$ NWs of 3 wt.%. (The impact force is of 9 N)
Fig. S5 Circuit diagram of the wireless integrated circuit system

Volunteer No. 1

Female, 24 years old, 170cm, 62 kg

Walking

Running

The heel  Inner side of the forefoot  Outer side of the forefoot

Fig. S6 Piezoelectric signals of volunteer No. 1. The part where the habitual abrasion occurs of their shoes is under the heel.
**Fig. S7** Piezoelectric signals of volunteer No. 2. The part where the habitual abrasion occurs of their shoes is under inner side of the forefoot.

**Volunteer No. 2**

Male, 21 years old, 175 cm, 68 kg

**Walking**

**Running**

The heel  Inner side of the forefoot  Outer side of the forefoot

**Fig. S8** Piezoelectric signals of volunteer No. 3. The part where the habitual abrasion occurs of their shoes is under the heel and outer side of the forefoot.

**Volunteer No. 3**

Male, 25 years old, 168 cm, 68 kg

**Walking**

**Running**

The heel  Inner side of the forefoot  Outer side of the forefoot
Volunteer No. 4

Male, 25 years old, 175 cm, 75 kg

Walking

Running

The heel | Inner side of the forefoot | Outer side of the forefoot

Fig. S9 Piezoelectric signals of volunteer No. 4. The part where the habitual abrasion occurs of their shoes is under inner side of the forefoot.
**Table S1** Comparison between the wireless piezoelectric device with some other wireless sensors using mobile phone as receiver

<table>
<thead>
<tr>
<th>Principle</th>
<th>Active material</th>
<th>Active area</th>
<th>Output Current</th>
<th>Output Voltage</th>
<th>Additional polarization process</th>
<th>Sensitivity</th>
<th>Response time</th>
<th>Transmitting distance</th>
<th>Ref.</th>
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<tbody>
<tr>
<td>Piezoelectricity</td>
<td>Cotton threads/</td>
<td>-</td>
<td>11.22 nA</td>
<td>Y</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>CNTs/PTFE</td>
<td>3×4 cm²</td>
<td>35 μA</td>
<td>200 V</td>
<td>Y</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
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<tr>
<td>Piezoelectricity</td>
<td>PMN-PZT</td>
<td>1×1 cm²</td>
<td>1.74 μA</td>
<td>17.8 V</td>
<td>Y</td>
<td>-</td>
<td>34 ms</td>
<td>5 m</td>
<td>3</td>
</tr>
<tr>
<td>Piezoelectricity</td>
<td>PPy@PVA-co-PE</td>
<td>0.75×25 cm²</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.24 kPa⁻¹</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Piezoelectricity</td>
<td>PZT</td>
<td>2×4 cm²</td>
<td>12 μA</td>
<td>500 V</td>
<td>N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Piezoelectricity</td>
<td>Silk fibroin/PVDF</td>
<td>2×4 cm²</td>
<td>12 μA</td>
<td>500 V</td>
<td>N</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Piezoelectricity</td>
<td>BaTiO₃ NWs/PVDF</td>
<td>3.5 × 3.5 cm²</td>
<td>105.69 nA</td>
<td>0.128 V</td>
<td>N</td>
<td>0.017 kPa⁻¹</td>
<td>290 ms</td>
<td>8 m</td>
<td>This work</td>
</tr>
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</table>

[- present not given].

**Abbreviations:** CNT, Carbon nanotube; PTFE, Polytetrafluoroethylene; Y, Yes; N, No; PZT, Pb(ZrxTi1−x)O3; PMN-PZT, (1-x)Pb(Mg1/3Nb2/3)O3-(x)Pb(Zr,Ti)O3; PPy, Polypyrrole; PVA-co-PE, Poly(vinyl alcohol-co-ethylene); PVDF, Poly(vinylidene fluoride); MWCNTs, Multiwalled carbon nanotubes; PANI, polyaniline.
References