Electronic Supplementary Information

Achieving Ultrahigh Direct-Current Voltage of 130 V by Semiconductor Heterojunction Power Generation Based on Tribovoltaic Effect

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**Table S1. The performance of different type TENGs based on tribovoltaic effect**

<table>
<thead>
<tr>
<th>Type</th>
<th>Materials</th>
<th>Open Voltage(V)</th>
<th>Short current(μA)</th>
<th>Area(cm²)</th>
<th>Impedance(Ω)</th>
<th>Power(μW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip contact</td>
<td>Graphite/n-Si</td>
<td>0.13</td>
<td>0.0034</td>
<td>1.6×10⁻⁷</td>
<td>-</td>
<td>1.1×10⁻⁴</td>
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<tr>
<td></td>
<td>p-Si/Al</td>
<td>0.4</td>
<td>5</td>
<td>0.01</td>
<td>1×10⁵</td>
<td>0.3</td>
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<tr>
<td></td>
<td>Au/PPy-SnO₂/Al</td>
<td>0.25</td>
<td>3.6</td>
<td>1.3</td>
<td>1×10⁵</td>
<td>0.24</td>
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<tr>
<td></td>
<td>PPy/Au</td>
<td>0.7</td>
<td>290</td>
<td>1.33</td>
<td>8200</td>
<td>0.25</td>
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<tr>
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<td>PPy-GO/Au</td>
<td>0.73</td>
<td>175</td>
<td>1.33</td>
<td>4700</td>
<td>0.28</td>
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<tr>
<td></td>
<td>Al/PANI-HCl/Au</td>
<td>0.9</td>
<td>45</td>
<td>1.33</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Conducting polymer</td>
<td>PEDOT-PSS/Al</td>
<td>0.8</td>
<td>200</td>
<td>2.54</td>
<td>10000</td>
<td>14</td>
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<tr>
<td></td>
<td>PEDOT-PSS/Al</td>
<td>1</td>
<td>309</td>
<td>2.5</td>
<td>20000</td>
<td>2.9</td>
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<tr>
<td></td>
<td>PEDOT-PSS/Al</td>
<td>0.7</td>
<td>9</td>
<td>1</td>
<td>30000</td>
<td>0.11</td>
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<tr>
<td>Liquid-Semiconductor</td>
<td>DI water/ Si</td>
<td>0.4</td>
<td>0.3</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
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<td>Water/n-Si</td>
<td>0.3</td>
<td>0.64</td>
<td>-</td>
<td>-</td>
<td>2.3×10⁻³</td>
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<tr>
<td></td>
<td>Si/water</td>
<td>1</td>
<td>0.7</td>
<td>-</td>
<td>2.5×10⁵</td>
<td>8×10⁻³</td>
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<td>Surface contact</td>
<td>Si/stainless</td>
<td>0.02</td>
<td>20</td>
<td>1</td>
<td>5000</td>
<td>0.02</td>
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<tr>
<td></td>
<td>n-Si/p-Si</td>
<td>0.35</td>
<td>0.58</td>
<td>1</td>
<td>1×10⁶</td>
<td>1.2×10⁻⁴</td>
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<tr>
<td></td>
<td>n-Si/Al</td>
<td>0.6</td>
<td>10</td>
<td>3</td>
<td>-</td>
<td>0.5</td>
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<tr>
<td></td>
<td>Carbon aerogel/Si</td>
<td>2</td>
<td>15</td>
<td>0.785</td>
<td>1.46×10⁴</td>
<td>4.76</td>
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<td></td>
<td>Si/AlN/MoS₂</td>
<td>5.1</td>
<td>5.6</td>
<td>0.0005</td>
<td>3.6×10⁵</td>
<td>6.5</td>
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<td></td>
<td>Black phosphorus/Si/AlN/Si</td>
<td>6.1</td>
<td>6.2</td>
<td>0.0005</td>
<td>4.5×10⁵</td>
<td>10</td>
</tr>
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<td></td>
<td>This work</td>
<td>130</td>
<td>15</td>
<td>1</td>
<td>1×10⁷</td>
<td>280</td>
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References


10 S. Lin, X. Chen and Z. L. Wang, *Nano Energy*, 2020, **76**.


