Supplementary Information (SI) for Journal of Materials Chemistry A.


# Supporting Information for

## Triboelectric nanogenerator for harvesting ultra-high-speed wind energy with high-frequency output

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**Supplementary Table：**

**Table S1.** Prices of components for the triboelectric nanogenerator (TENG) with dimensions of 110 mm × 11 mm.

| **Materials** | **Cost (CNY)** |
|---|---|
| Acrylic sheet | 1.03 |
| PI | 0.057 |
| Acrylic screws | 0.48 |
| Sponge | 0.18 |
| Copper adhesive tape | 0.847 |
| **Total** | **2.594** |

**Supplementary Figures：**

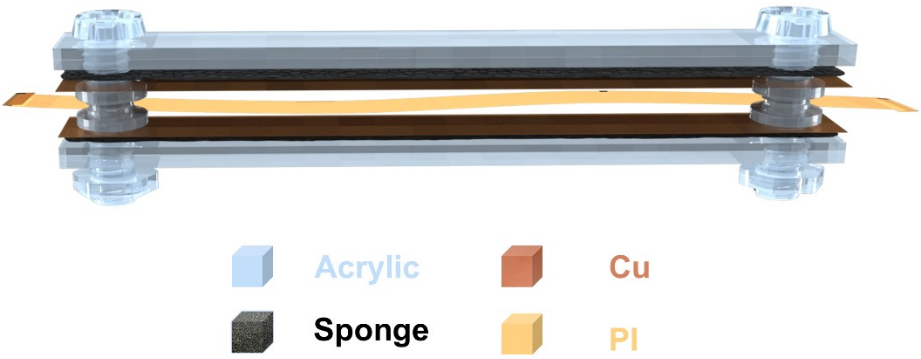


**Fig. S1:** Schematic diagram of the TENG with a PI film. Length can be from 1.5 mm to 11 mm.

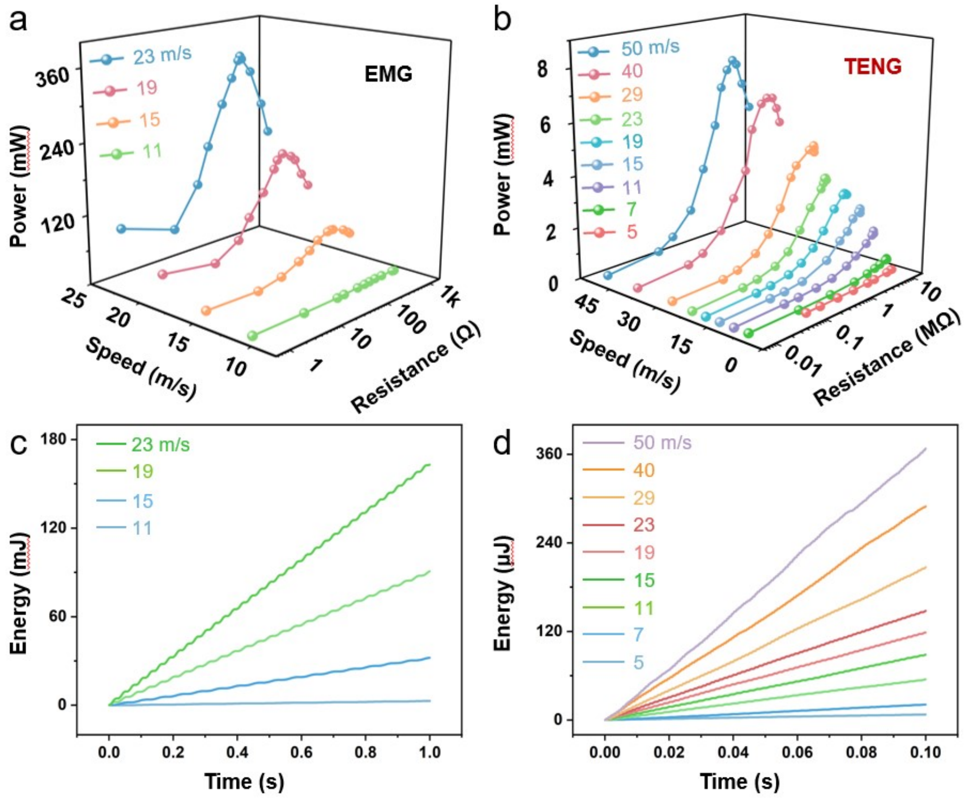


**Fig. S2:** (a, b) Power output at different wind speeds for (a) EMG and (b) TENG. (c) Electromagnetic generator (EMG) and (d) TENG output energy at different wind speeds.


**Fig. S3:** Schematic of TENG with a metallic sheet as the vibration layer.

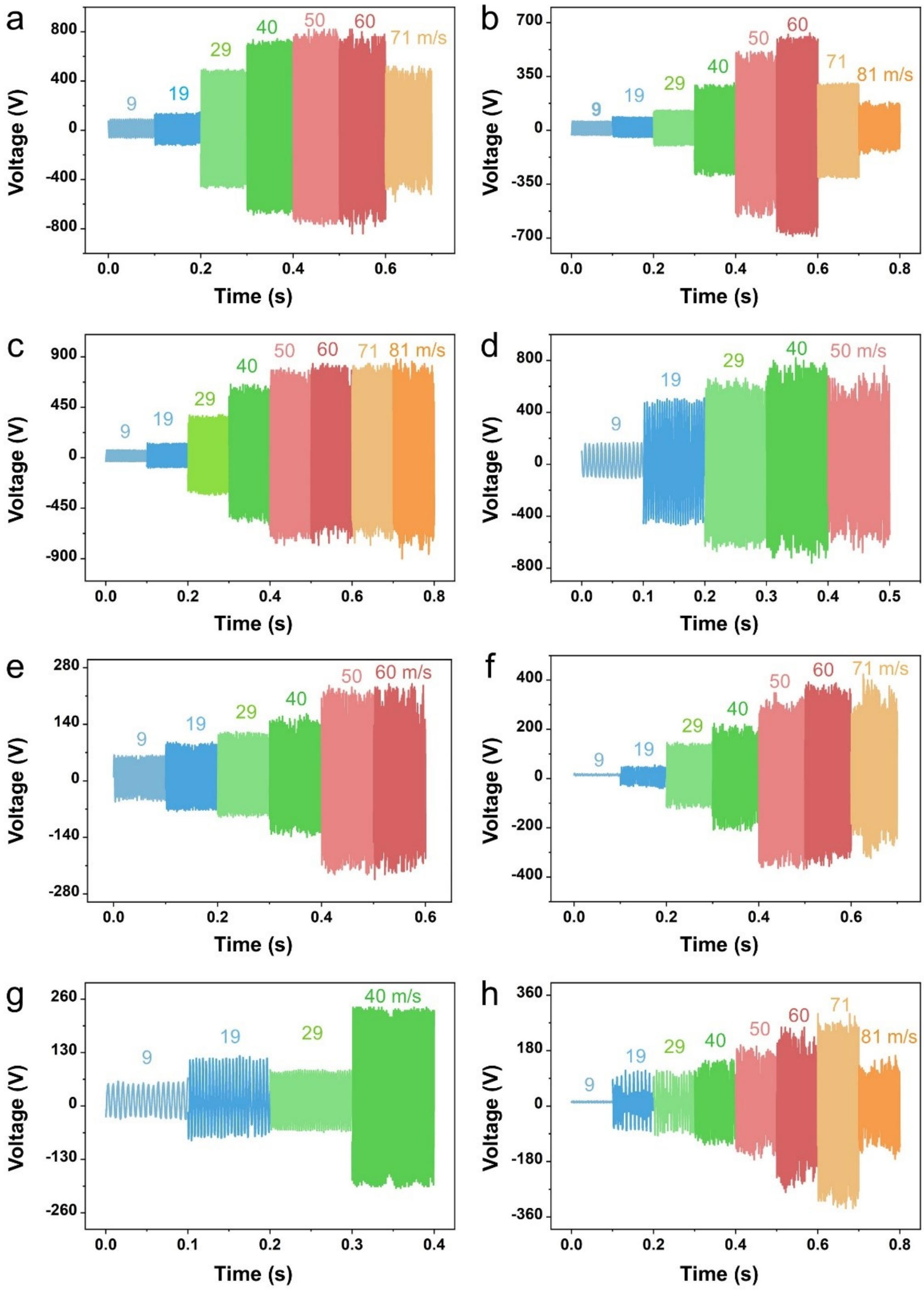


**Fig. S4:** (a-e). Load voltage using 50 μm Polyamide66 (PA66) film (a), Polyamide6 (PA6) film (b), Polyimide (PI) film (c), Fluorinated ethylene propylene (FEP) film (d), and Polyethylene (PE) film (e) friction with Cu electrodes at different wind speeds. (f-h) Voltage using 50 μm stainless steel sheet (f), aluminum sheet (g), and copper sheet (h) friction with PA6 film at different wind speeds.

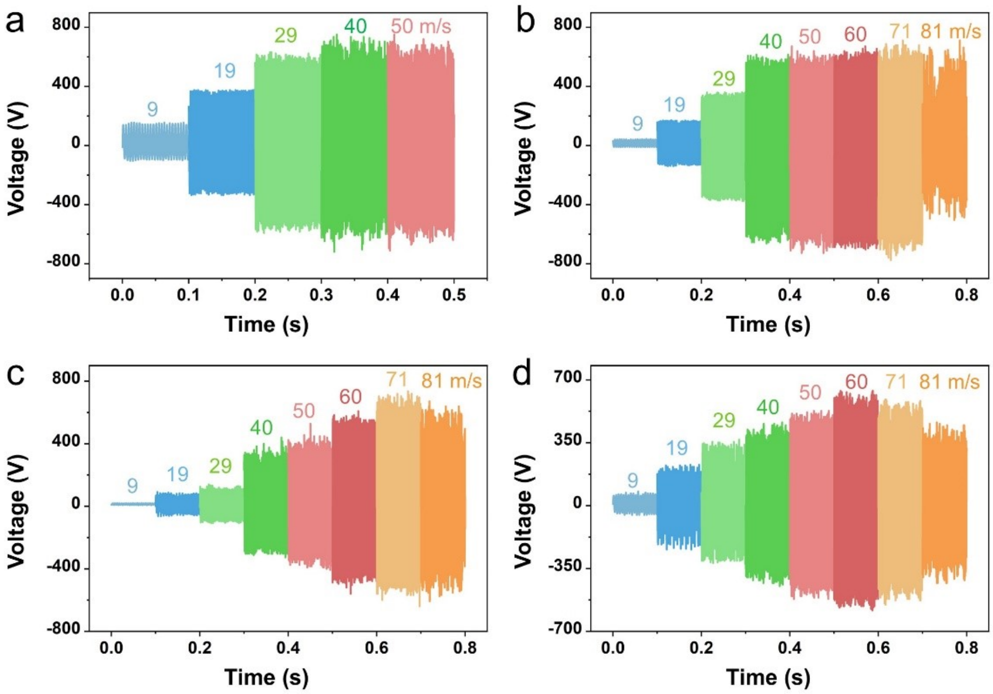


**Fig. S5: (**a-d) Load voltage of TENG with PI films with a thickness of 30 μm (a), 75 μm (b), 150 μm (c), and 200 μm (d) at different wind speeds for a TENG with dimensions of 110 mm × 11 mm.

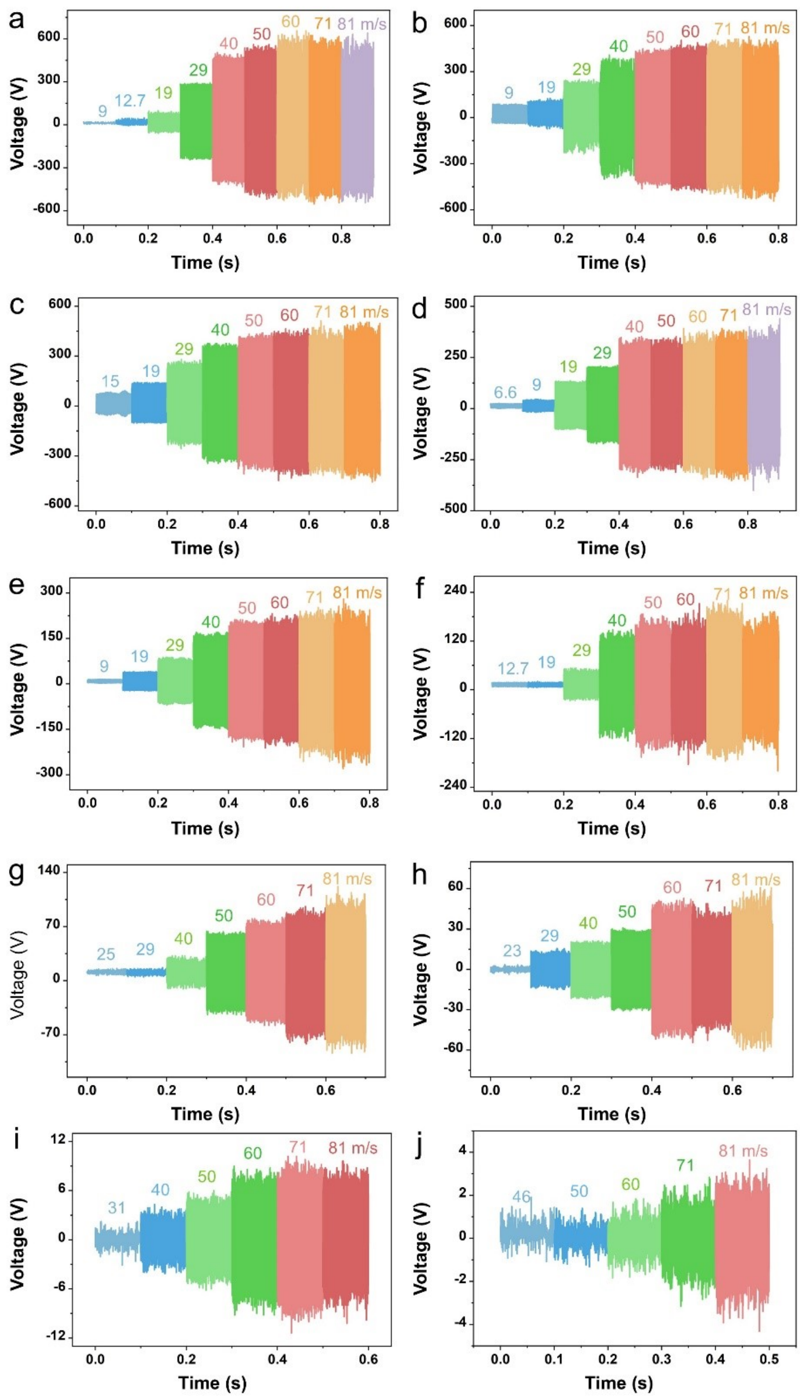


**Fig. S6:** (a-j) Load voltage output of a TENG with 50 μm thick vibration layers at various wind speeds for different sizes: 100 mm × 10 mm × 1.5mm (a), 90 mm × 9 mm × 1.5mm (b), 80 mm × 8 mm × 1.5mm (c), 70 mm × 7 mm × 1.5mm (d), 60 mm × 6 mm × 1.5mm (e), 50 mm × 5mm × 1.5mm (f), 40 mm × 4mm × 1.5mm (g), 30 mm × 3 mm × 1mm (h), 20 mm × 2 mm × 1 mm (i), and 15 mm × 1.5 mm × 1mm (j). This dimension represents the effective vibration (length) x (width of the device) x (the height of the single-layer spacer).

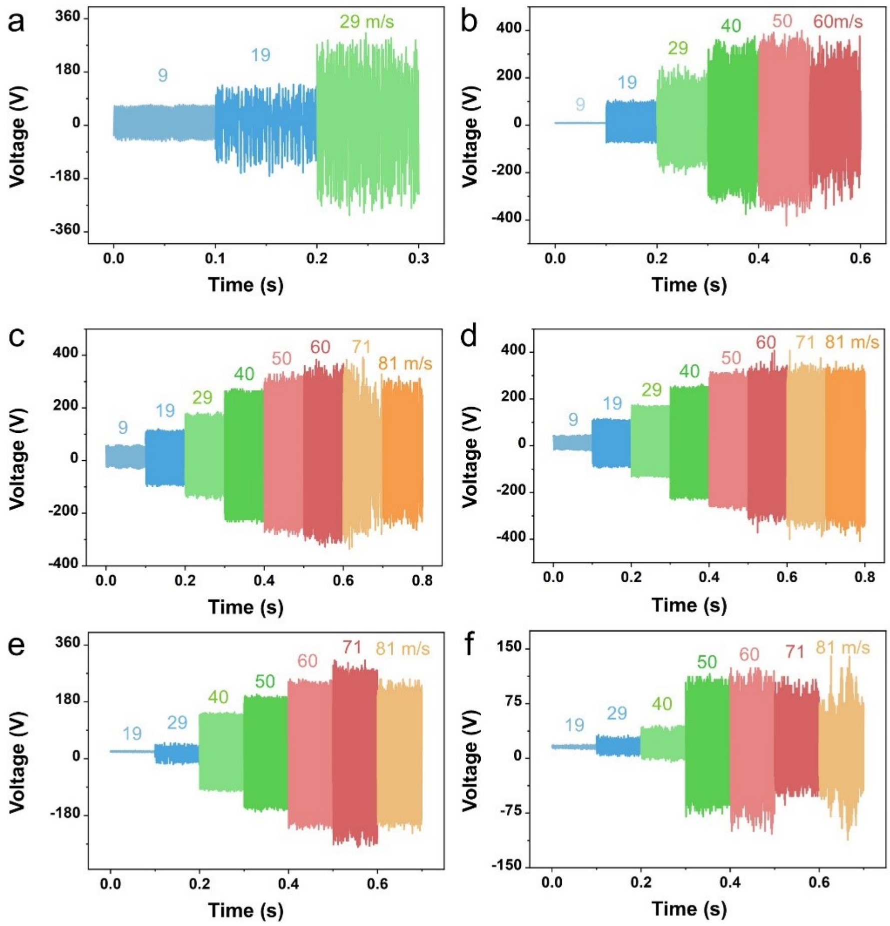


**Fig. S7:** (a-f) Load voltage of TENG with PI films with a thickness of 10 μm (a), 30 μm (b), 50 μm (c), 75 μm (d), 150 μm (e), and 200 μm (f) at different wind speeds for a TENG with dimensions of 70 mm × 7 mm.

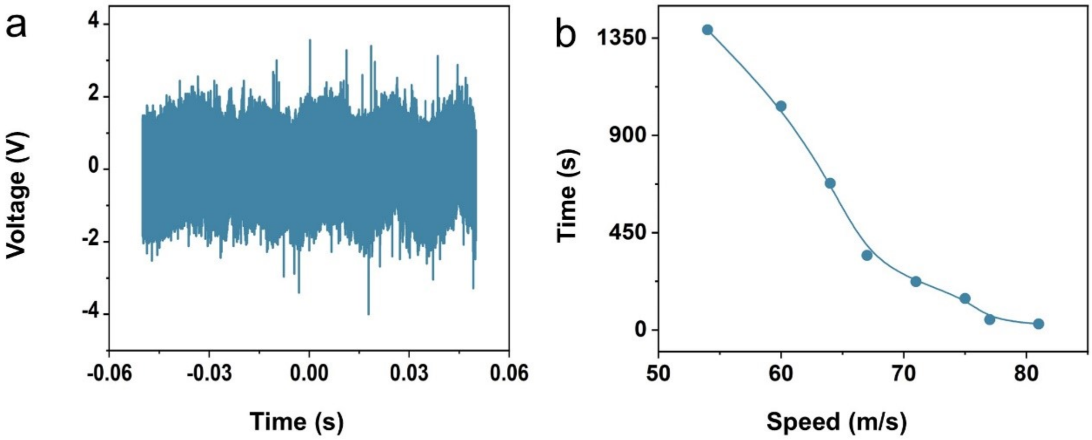


**Fig. S8:** (a) Load voltage output of a TENG with a 5 μm thick vibration layer and dimension of 10 mm × 3 mm × 1 mm at a wind speed of 81 m/s within 0.1 seconds. (b) Breakdown threshold of a TENG with a dimension of 110 mm × 11 mm and a 50 μm thick vibration layer at different wind speeds.

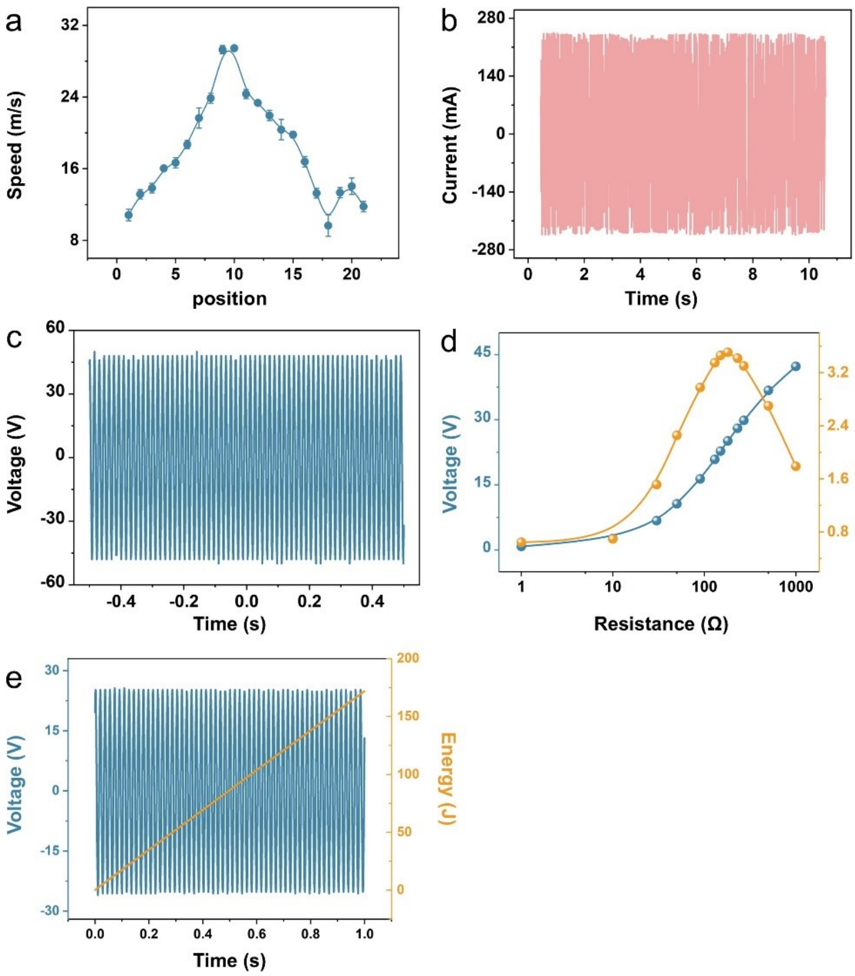


**Fig. S9:** (a) Average wind speed at different positions of the blower fan. (b, c) Output short circuit current (b) and load voltage (c) of EMG at 18 m/s wind speed. (d) Relationship between the output voltage and power of conventional wind turbines at 18 m/s wind speed under various loads. (e) Relationship between the output voltage and energy of conventional wind turbines at 18 m/s wind speed.

**Video S1.** Records the wind speed increasing until the wind speed exceeds 81 m/s, the output voltage of TENG.