High Efficient and Continuous Triboelectric Power Harvesting based on Porous β-phase Poly (vinylidene fluoride) Aerogel

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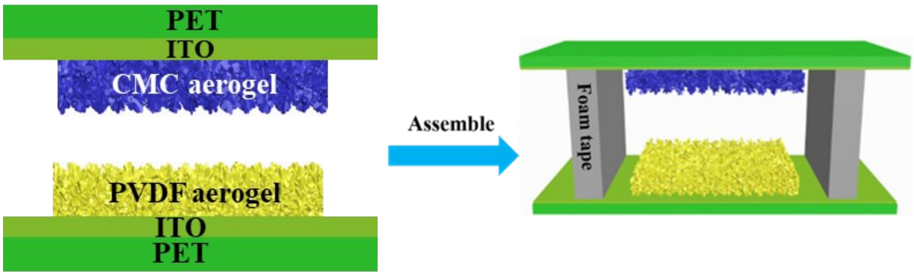

Figure S1. Schematic of TENG based on β-phase PVDF aerogel.

Calculation of aerogel porosity: [1-3]

The densities of the solid materials (ρ_s) were calculated according to Equation S1 based on the solid density of each component and their weight ratios used in the formulation,

$$\rho_s = \frac{1}{\frac{w_{P(BA-BMA)}}{\rho_{P(BA-BMA)}} + \frac{w_{CMC}}{\rho_{CMC}}} \qquad \text{(S1)}$$

where W was the weight percentage of the different components, and $\rho_{P(BA-BMA)}$ and ρ_{CMC} were the solid densities of P(BA-BMA) and CMC, respectively. The solid densities for P(BA-BMA) and CMC used here were 1080 and 600 kg m^{-3}, respectively, according to the manufacturer's data sheet. The porosities of the porous aerogel samples were calculated according to Equation S2,

$$\mathbf{Porosity} = \left(1 - \frac{\rho_a}{\rho_s}\right) \times 100\% \qquad \text{(S2)}$$

where ρ_a was the measured density of each porous aerogel sample, and ρ_s was the density of its corresponding solid sample.

Table S1 Parameters ρ_a, ρ_s, and porosities of the samples.

Samples	ρ_a (kg m^{-3})	ρ_s (kg m^{-3})	Porosity (%)
CMC aerogel	10	600	98.3%
Compressed CMC aerogel film	208.2	600	65.3%
PVDF aerogel	41.1	1800	97.7%
Compressed PVDF aerogel film	537.8	1800	70.1%

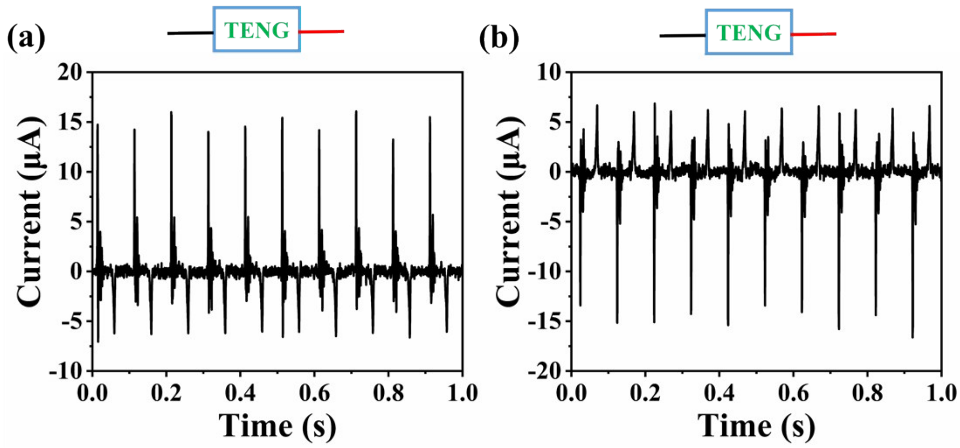

Figure S2. The I_{sc} of TENG connected in reverse under a compressive stress of 0.08 MPa at a frequency of 10 Hz.

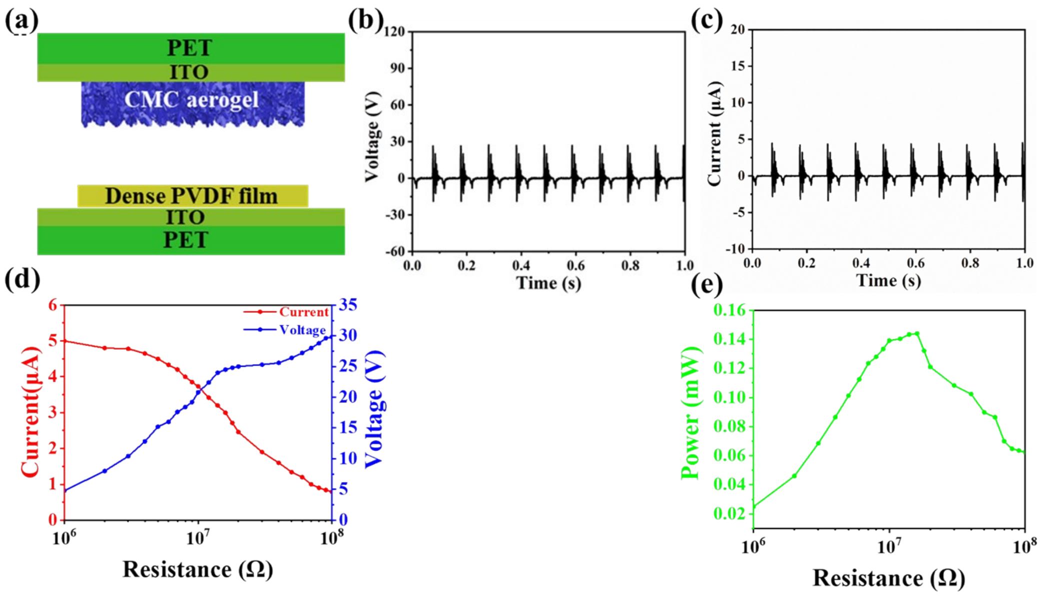

Figure S3. (**a**) Schematic of TENG based on dense PVDF film. (**b**) The V_{oc} and (**c**) I_{oc} of TENG based on dense PVDF film under a compressive stress of 0.08 MPa at a frequency of 10 Hz. (**d**, **e**) Output performance for TENG based on dense PVDF film loaded with a resistance from 10^6 Ω to 10^8 Ω.

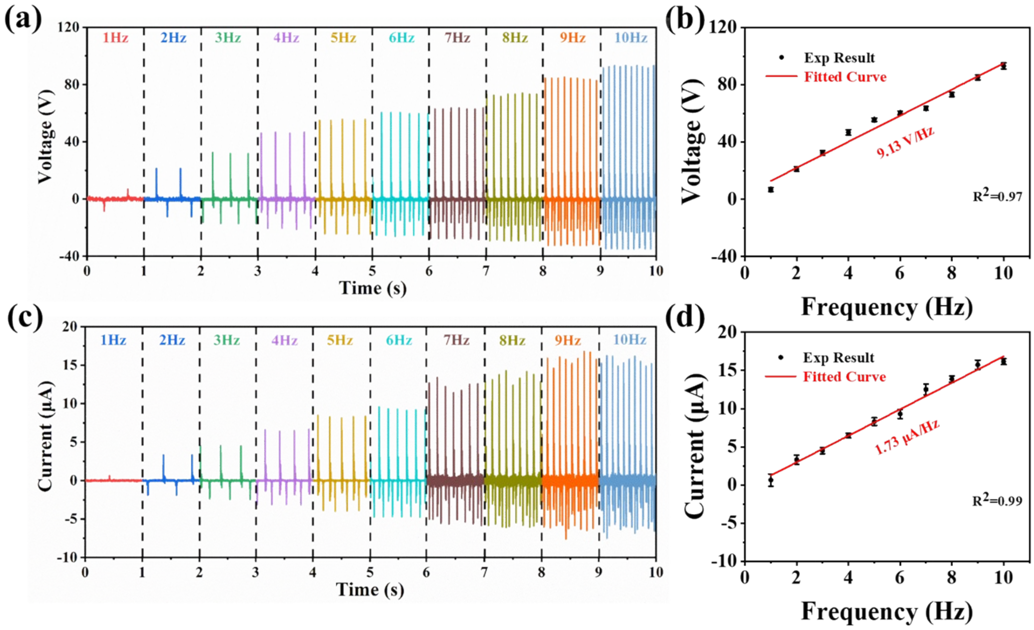

Figure S4. The V_{oc} and I_{sc} of TENG based on β-phase PVDF aerogel at different frequencies under a periodic pressure of 0.08 MPa.

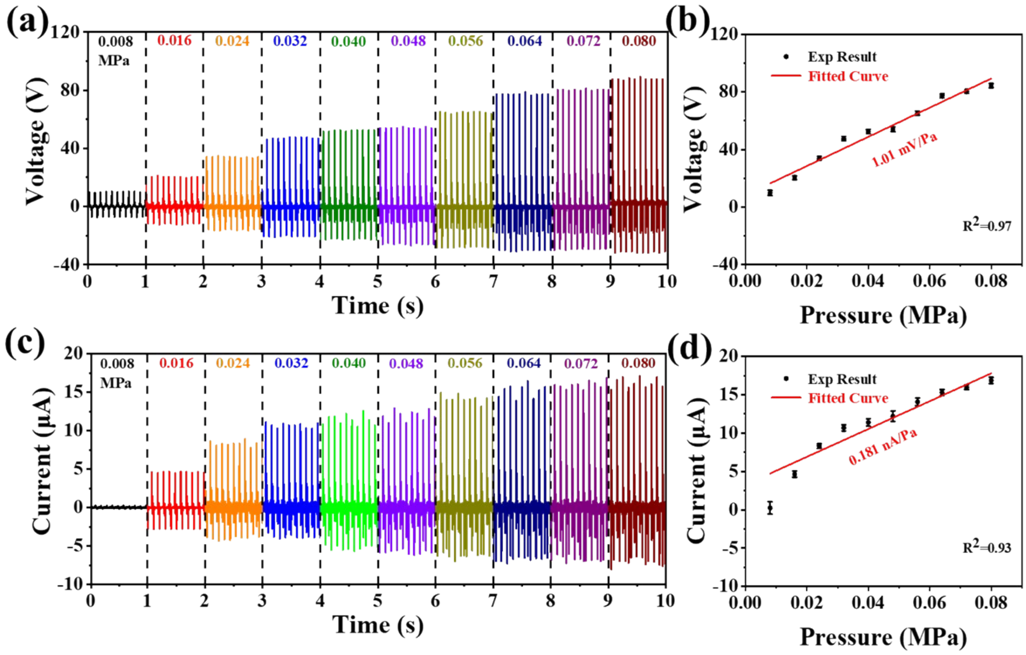

Figure S5. The V_{oc} and I_{sc} of TENG based on β-phase PVDF aerogel at different pressure under a frequency of 10 Hz.

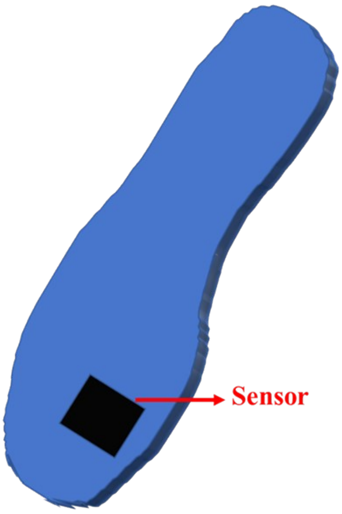

Figure S6. Schematic of the self-powered motion sensor.

References

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2. Q. Zheng, Z. Cai and S. Gong, *J. Mater. Chem. A*, 2014, 2, 3110-3118.
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