Supplementary information

Design of triboelectric nanogenerators featuring motion form conversion, motion rectification, and frequency multiplication for low-frequency ocean energy harvesting

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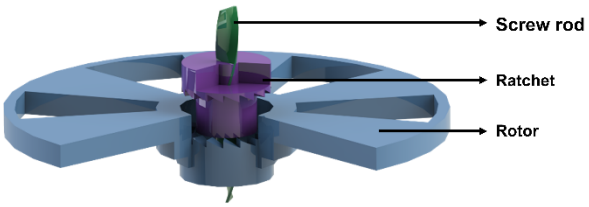

Fig. S1 Detailed diagram of screw, ratchet and rotor.

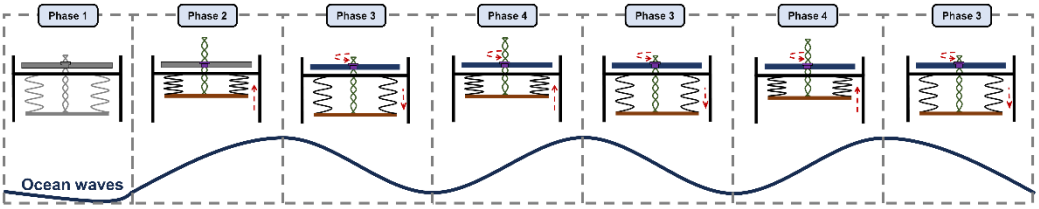

Fig. S2 The operation diagram of the TENG device correlated with water wave triggering.

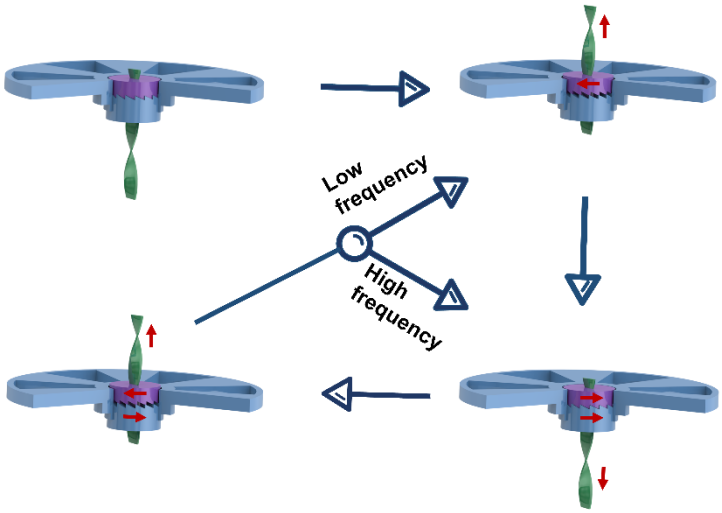

Fig. S3 The working route of the rotator under low- or high-frequency excitation.

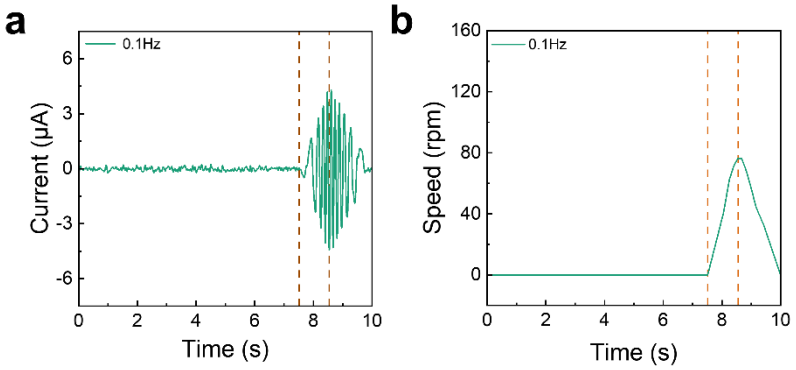

Fig. S4 (a) Current and (b) speed under external excitation of 0.1Hz with a lead of 45mm.

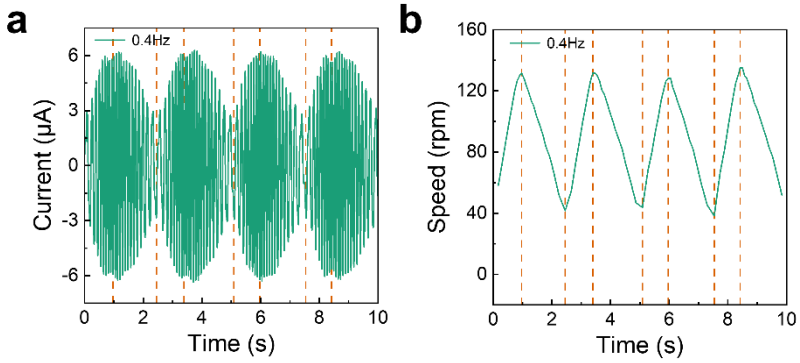

Fig. S5 (a) Current and (b) speed under external excitation of 0.4Hz with a lead of 45mm.

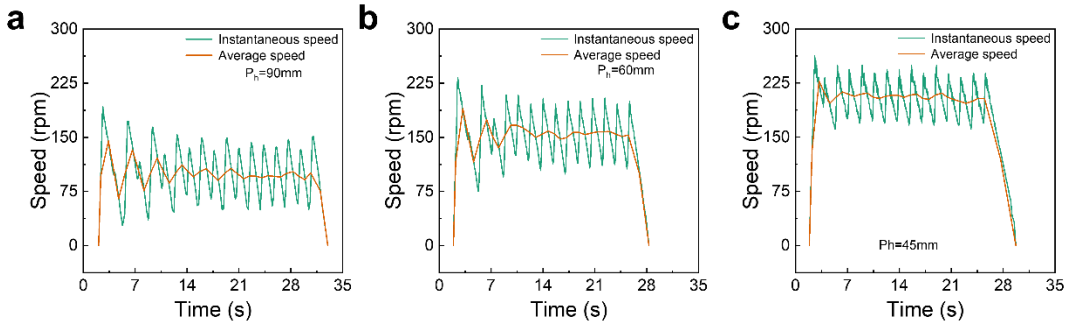

Fig. S6 Rotor speeds corresponding to screw rods with (a) 90mm, (b) 60mm and (c) 45mm leads.

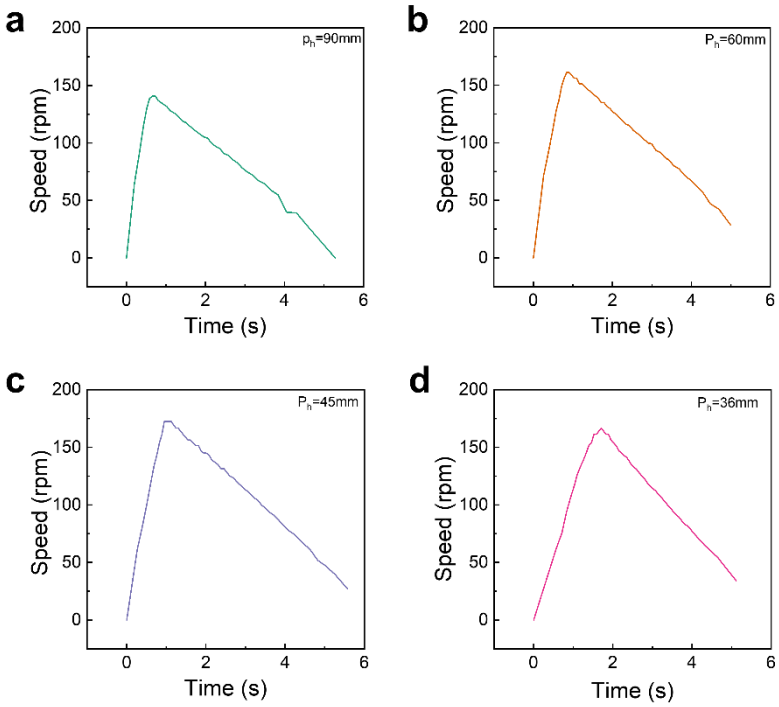

Fig. S7 The rotation speed of rotor in one cycle in external excitation frequency of 0.5Hz and amplitude of 90mm in a different SR-TENG lead of (a) 90mm, (b) 60mm, (c) 45mm, or (d) 36mm.

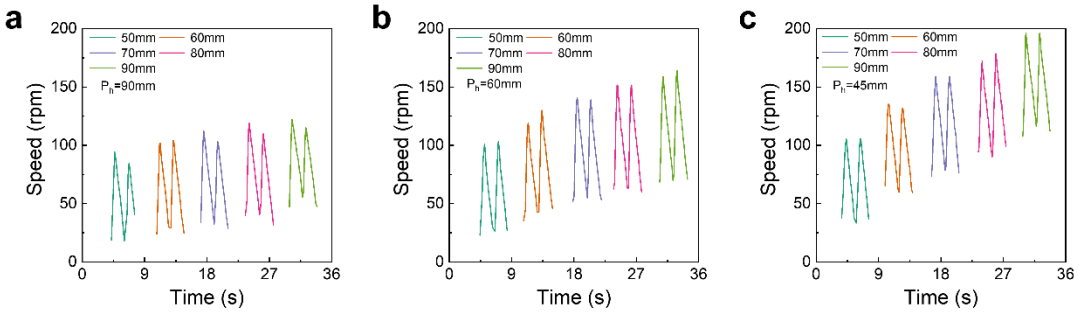

Fig. S8 Rotation speed of SR-TENG in different external excitation amplitudes and a different screw lead of (a) 90mm, (b) 60mm, or (c) 45mm.

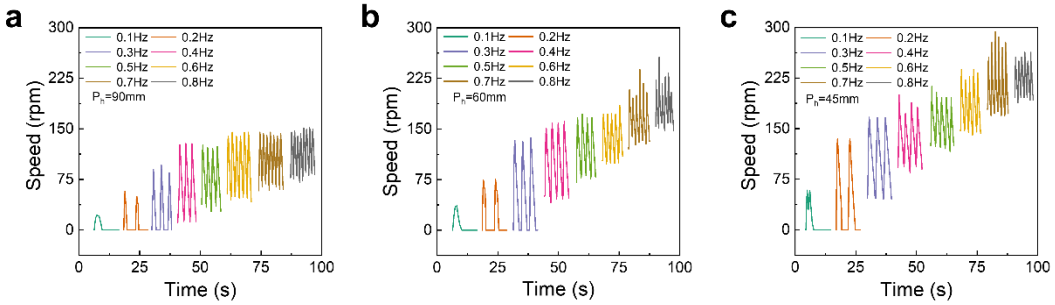

Fig. S9 Rotation speed of SR-TENG in different external excitation frequencies and screw leads of (a) 90mm, (b) 60mm, and (c) 45mm.

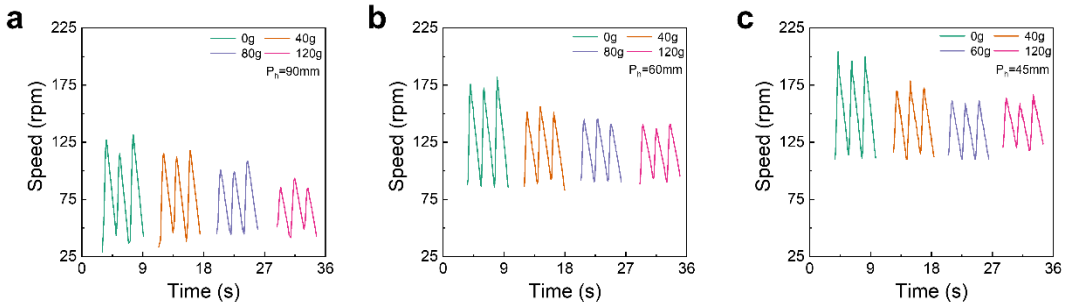

Fig. S10 Rotation speed of SR-TENG with a different extra mass of rotor in a different screw lead of (a) 90mm, (b) 60mm, or (c) 45mm.

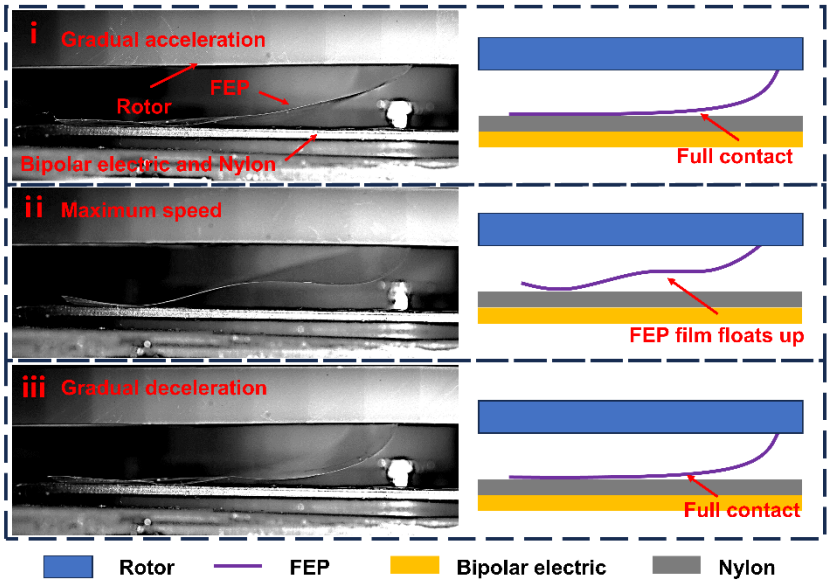

Fig. S11 The various contact states between FEP film and Nylon exhibited during different stages of rotor rotation. (i) Gradual acceleration, (ii) Maximum speed, (iii) Gradual deceleration.

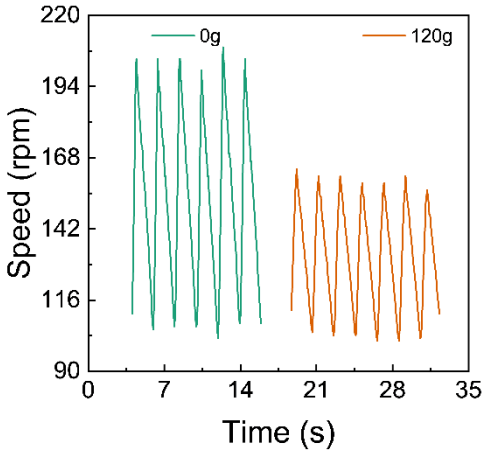

Fig. S12 Instantaneous rotational speed corresponding to different extra masses.

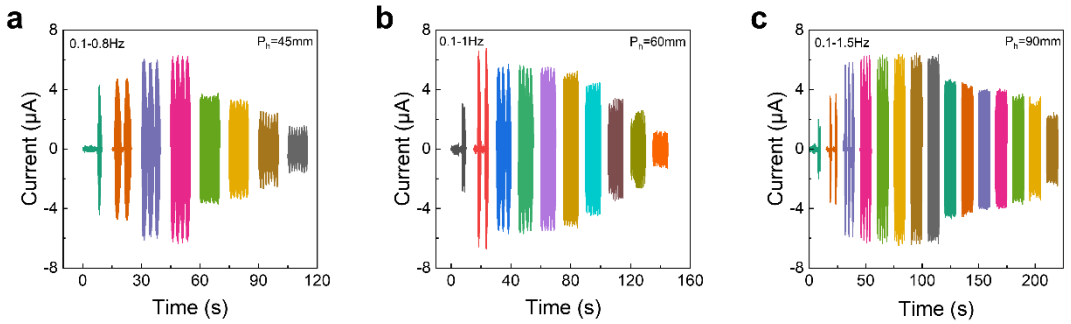

Fig. S13 Screw rods with leads of (a) 90mm, (b) 60mm and (c) 45mm correspond to the short-circuit currents of SR-TENG at different frequencies.

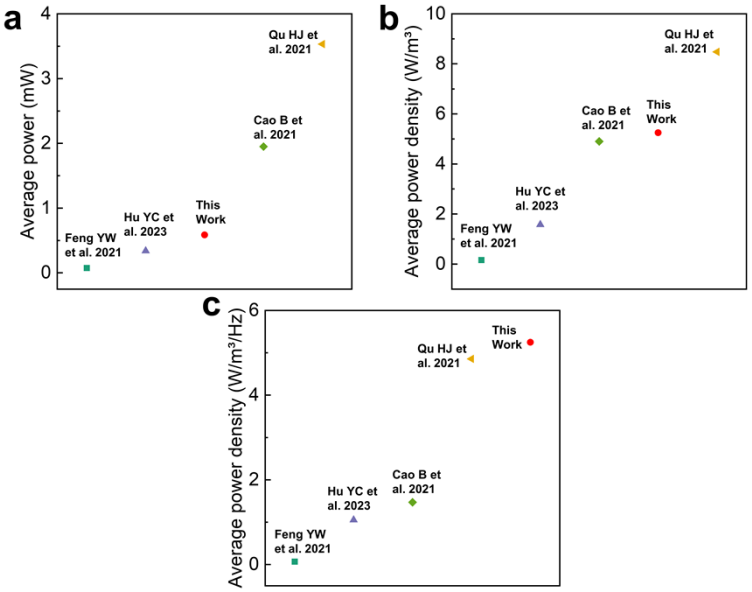

Fig. S14 Comparison of (a) average power and (b)(c) average power density between SR-TENG and other wave-driven TENG.

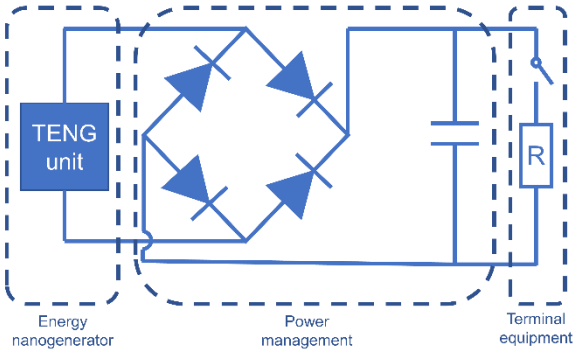

Fig. S15 Rectification circuit of SR-TENG for powering electronic devices.

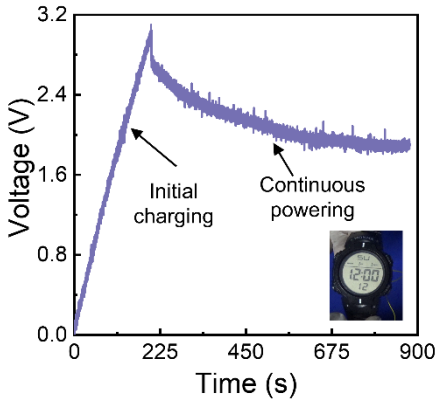

Fig. S16 The SR-TENG empowerment for an electronic watch.

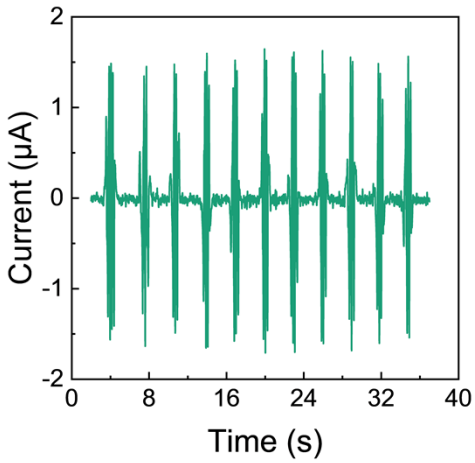

Fig. S17 Short-circuit current of SR-TENG under water wave triggering.