

Figure S1. A self-powered environmental monitoring system through harvesting wind energy by WD-TENG.

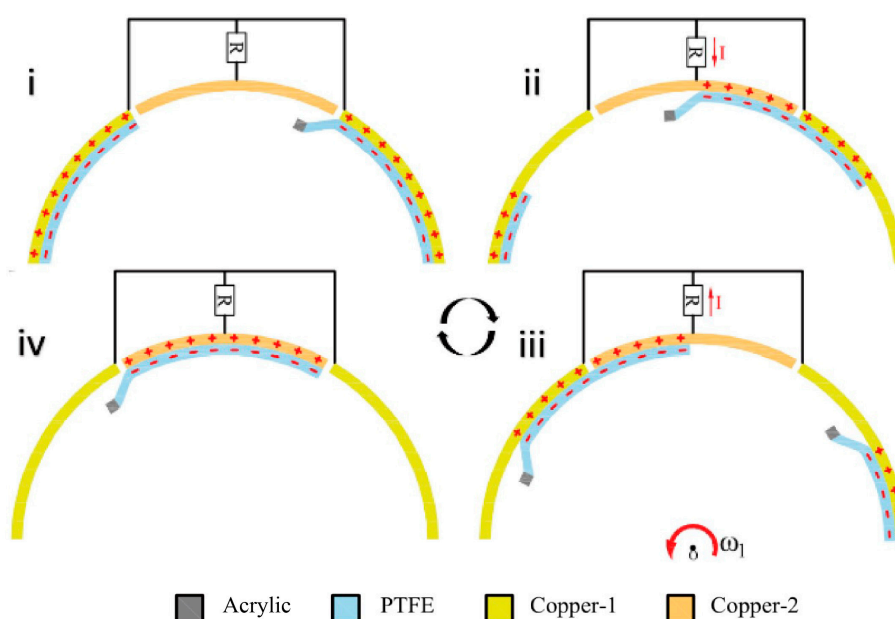


Figure S2. Schematic diagram of the working mechanism of the outer WD-TENG.

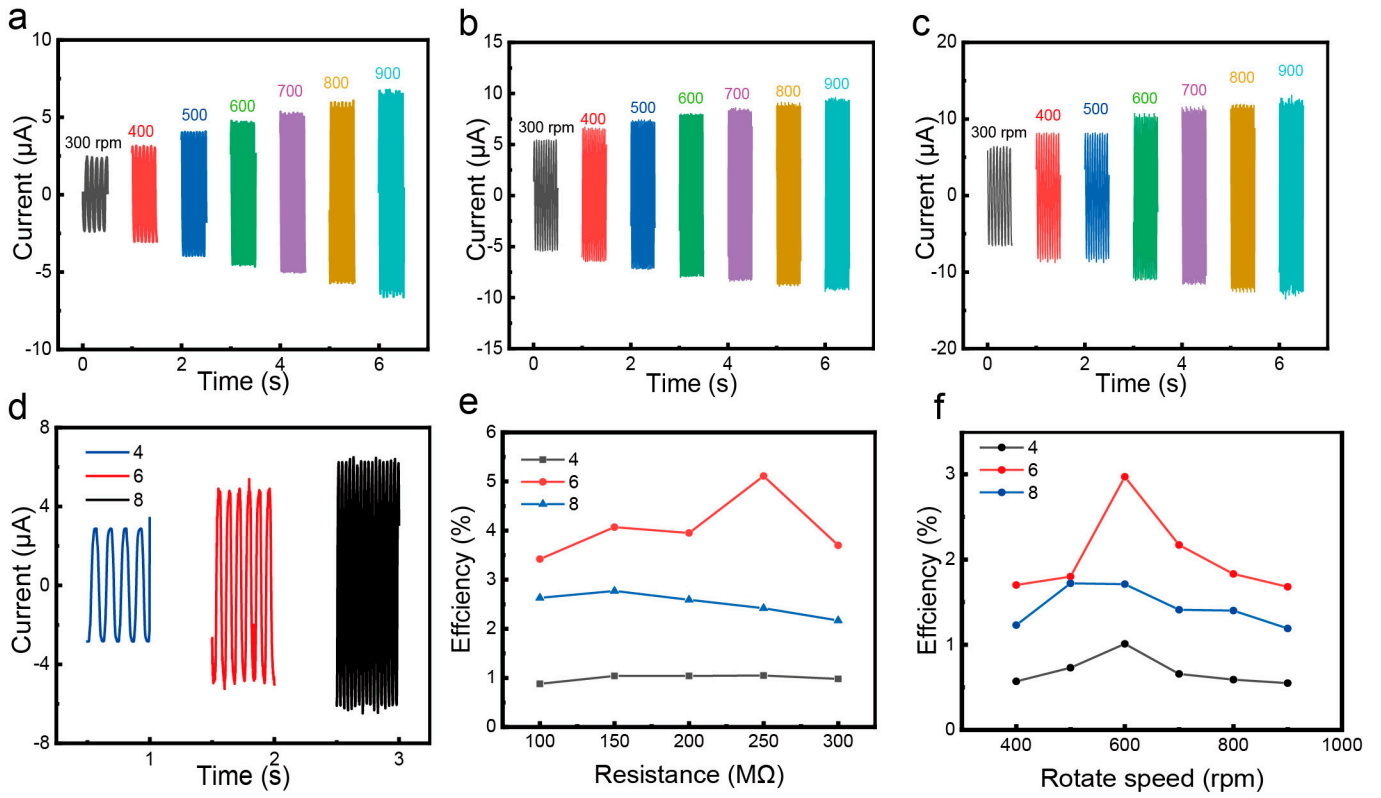


Figure S3. Comparison of output performance and mechanical energy conversion efficiency of DEL-WD-TENG with different grids. Electric output of the outer WD-TENG with (a) 4 grids, (b) 6 grids, and (c) 8 grids at different rotational speeds. (d) Electrical output of 4 grids, 6 grids, and 8 grids of the inner WD-TENG at different rotational speeds. Comparison of mechanical energy conversion efficiency with different grids of the (e) inner WD-TENG and (f) the outer WD-TENG.

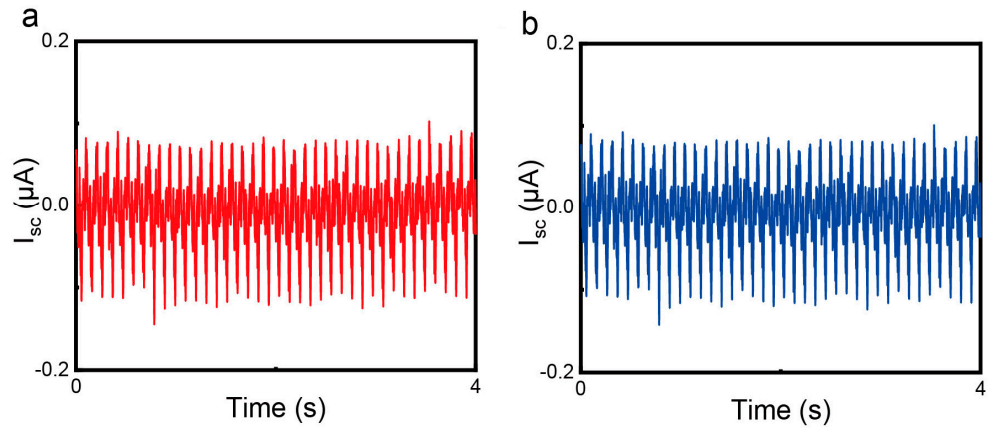


Figure S4. (a). Short-circuit current of the inner WD-TENG when rotational speed is higher than 400 rpm and (b) Short-circuit current of the outer WD-TENG when rotational speed is lower than 400 rpm.

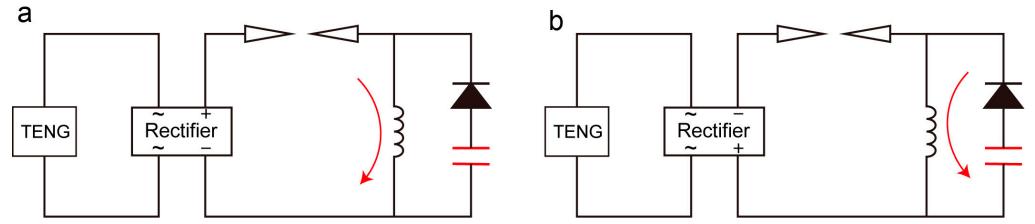


Figure S5. Power management circuit diagram of DEL-WD-TENG via a tip-tip air discharge switch. (a) Current direction when the tip-tip air discharge switch is on state, the energy transferred from the DEL-WD-TENG to the inductor. (b) Current direction when the tip-tip air discharge switch is off state, the energy transfers from the inductor to the capacitor.