



Supplementary Material

The regulation of O₂ spin state and direct oxidation of CO at room temperature using triboelectric plasma by harvesting mechanical energy

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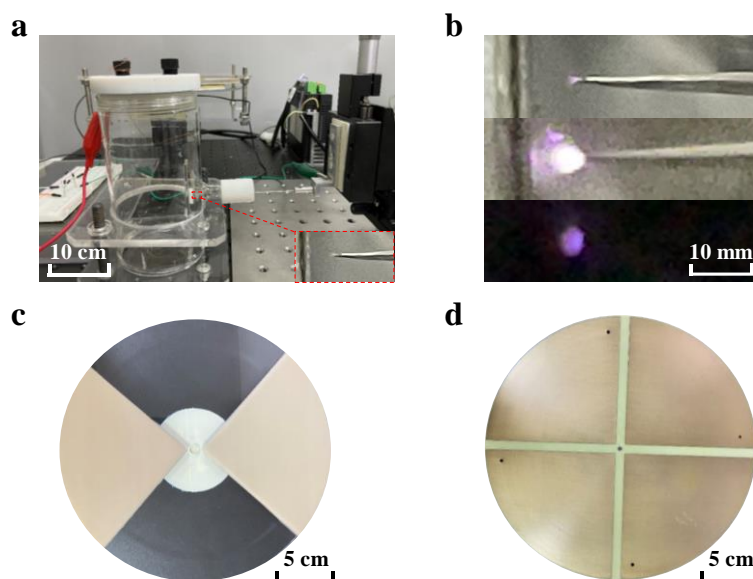


Figure S1. (a), Diagram of triboelectric plasma oxidation of CO at negative corona. (b), Triboelectric plasma at negative corona. (c), The rotating triboelectric layer of TENG. (d), The fixed metal triboelectric layer of TENG.

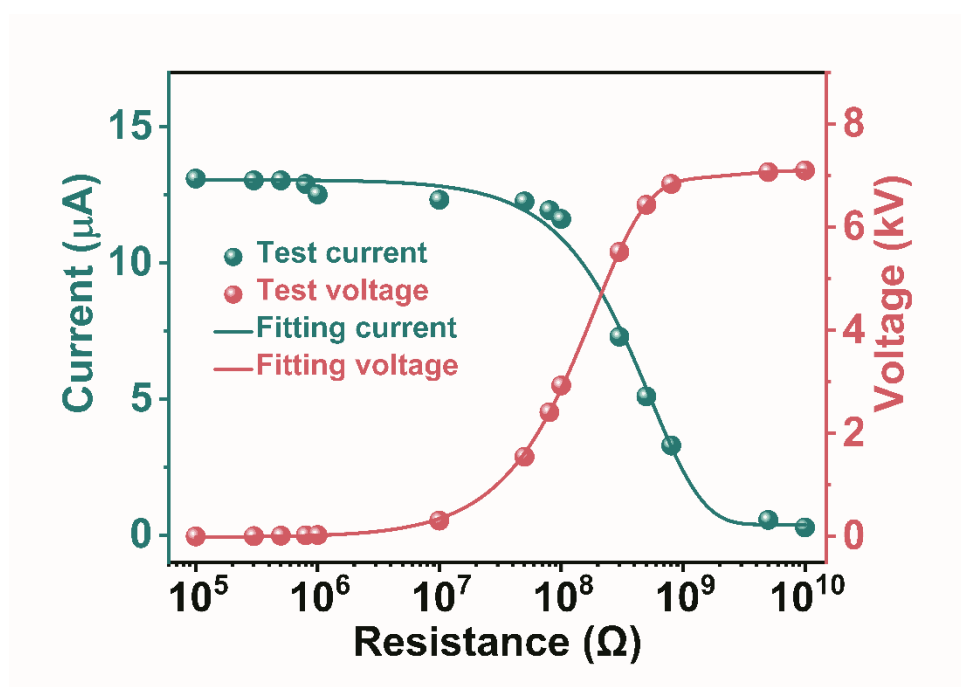


Figure S2. Voltage-impedance and current-impedance characteristic curves of the triboelectric nanogenerator.

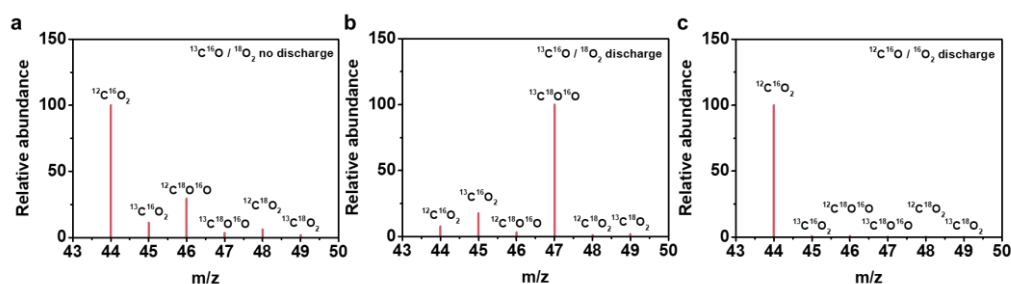


Figure S3. (a), Isotope exchange experiment using $^{13}\text{C}^{16}\text{O}$ and $^{18}\text{O}_2$ as substrates in the absence of triboelectric plasma. (b), Triboelectric plasma-induced CO oxidation using $^{13}\text{C}^{16}\text{O}$ and $^{18}\text{O}_2$ as substrates. (c), Triboelectric plasma-induced CO oxidation using $^{12}\text{C}^{16}\text{O}$ and $^{16}\text{O}_2$ as substrates. Reaction conditions: negative corona, 3 mm needle-plate distance, 400 rpm rotational speed, Pt as the electrode plate, $\text{CO}/\text{O}_2/\text{He}$ (1:20:79), 1 h discharge time, room temperature, and atmospheric pressure.

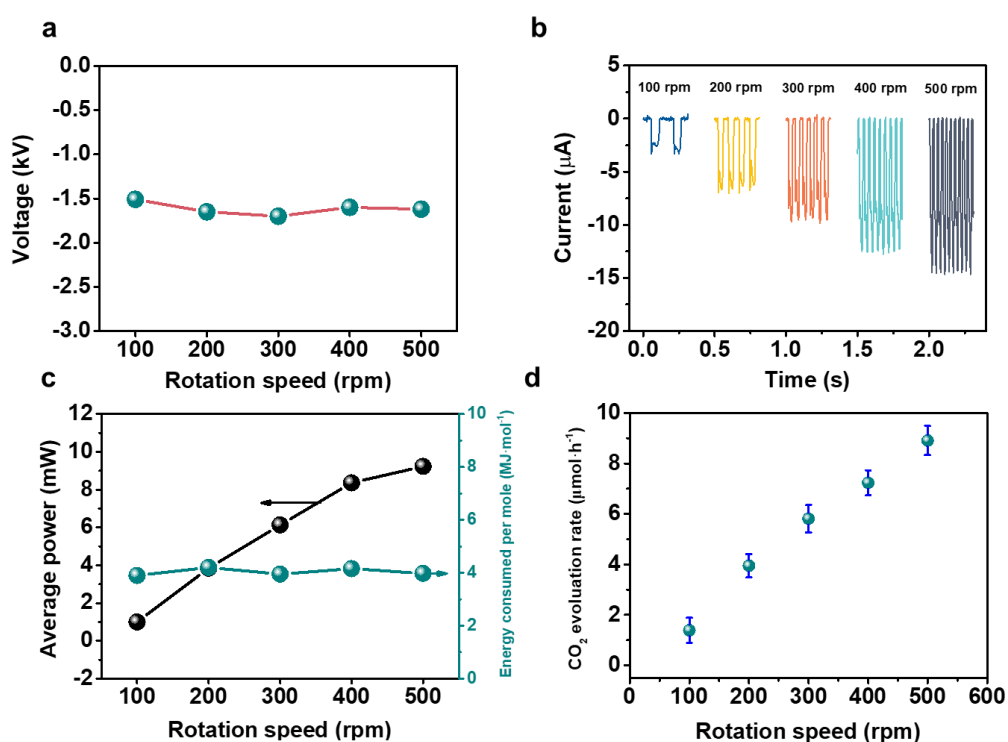


Figure S4. Triboelectric plasma-triggered CO oxidation at different rotational speeds of the triboelectric nanogenerator. (a), Voltage curve of triboelectric plasma at different rotational speeds. (b), Current curve of triboelectric plasma at different rotational speeds. (c), Average power and energy consumed per mole CO of triboelectric plasma at different rotational speeds. (d), Activity of CO oxidation at different rotational speeds. Reaction conditions: negative corona, 3 mm needle-plate distance, Pt as the electrode plate, CO/O₂/He (1:20:79), 1 h discharge time, room temperature, and atmospheric pressure.

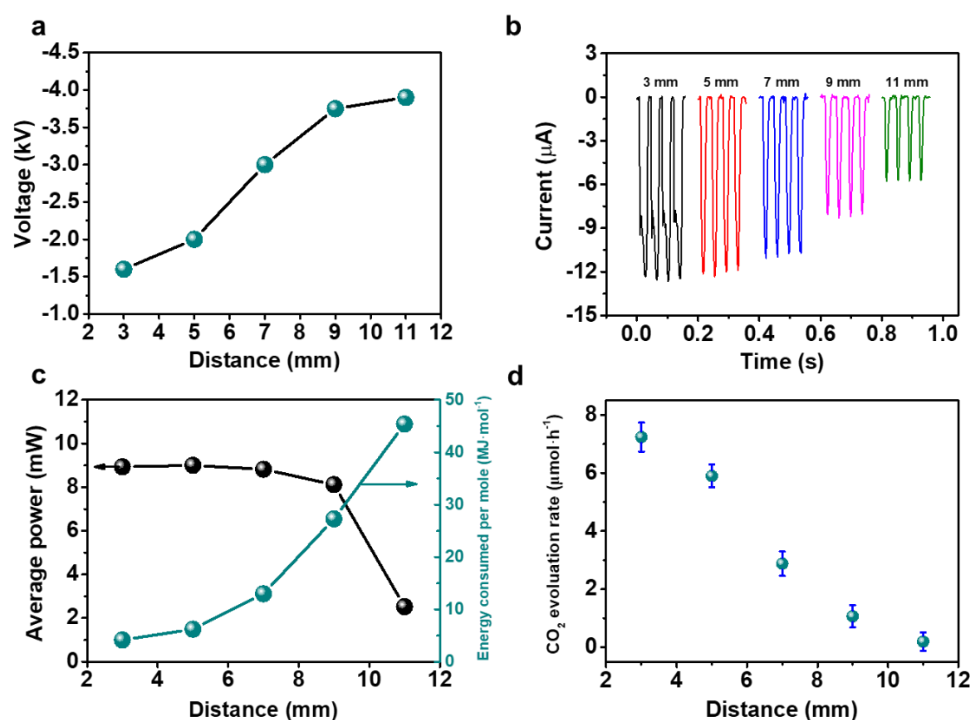


Figure S5. Triboelectric plasma-triggered CO oxidation at different needle-plate distances. (a), Voltage curve of triboelectric plasma at different needle-plate distances. (b), Current curve of triboelectric plasma at different needle-plate distances. (c), Average power curve and energy consumed per

mol CO of triboelectric plasma at different needle-plate distances. (d), Activity of CO oxidation at different needle-plate distances. Reaction conditions: negative corona, 400 rpm rotation speed, Pt as the electrode plate, CO/O₂/He (1:20:79), 1 h discharge time, room temperature, and atmospheric pressure.

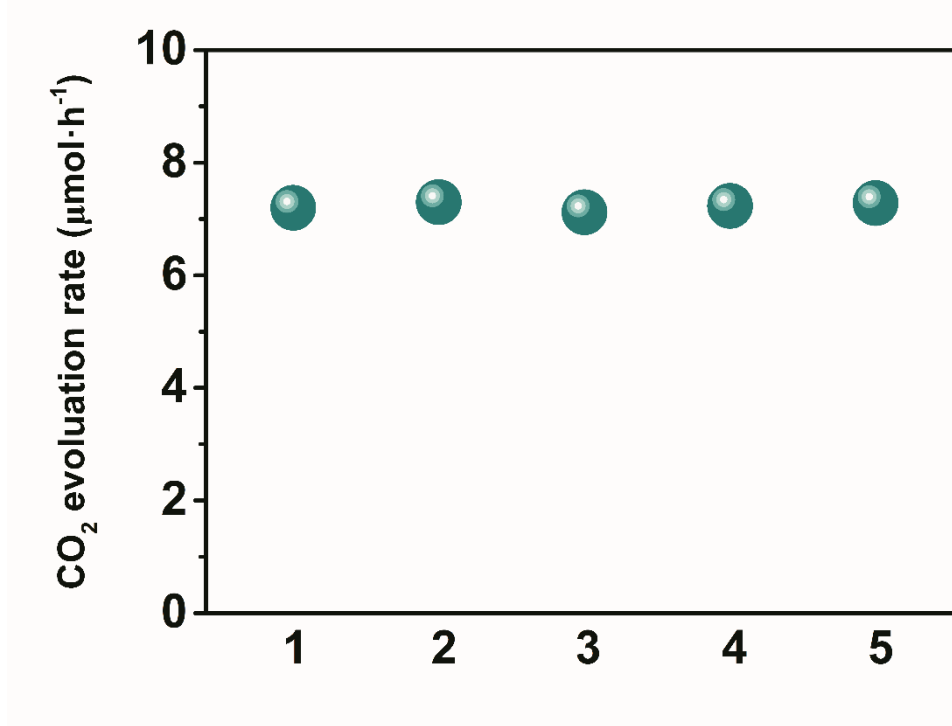


Figure S6. Cycle experiment of triboelectric plasma-triggered CO oxidation. Reaction conditions: negative corona, 3 mm needle-plate distance, 400 rpm rotation speed, Pt as the electrode plate, CO/O₂/He (1:20:79), 1 h discharge time, room temperature, and atmospheric pressure.

Table S1. Comparison of different methods of oxidation of CO.

Methods of oxidation of CO	Reaction temperature	Catalyst
Thermal catalysis	100 °C	Metal/metal oxides
Photocatalysis	25 °C	Metal/metal oxides
Triboelectric plasma	25 °C	-