Electronic Supplementary Information

Achieving Ultrahigh Direct-Current Voltage of 130 V by Semiconductor Heterojunction Power Generation Based on Tribovoltaic Effect

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The PDF file includes:
Electronic Supplementary Materials

Related Reference [1-18] in Electronic Supplementary Materials.

Table S1. The performance of different type TENGs based on tribovoltaic effect[1-18]

Type	Materials	Open Voltage(V)	Short current(uA)	Area(cm^2)	Impedance(Ω)	Power(μW)
Tip contact	Graphite/n-Si	0.13	0.0034	1.6×10^{-7}	-	1.1×10^{-4}
	p-Si/Al	0.4	5	0.01	1×10^{5}	0.3
Conducting polymer	Au/PPy-SnO_2/Al	0.25	3.6	1.3	1×10^{5}	0.24
	PPy/Au	0.7	290	1.33	8200	0.25
	PPy-GO/Au	0.73	175	1.33	4700	0.28
	Al/PANI-HCl/Au	0.9	45	1.33	-	-
	PEDOT-PSS/Al	0.8	200	2.54	10000	14
	PEDOT-PSS/Al	1	309	2.5	20000	2.9
	PEDOT-PSS/Al	0.7	9	1	30000	0.11
Liquid-Semiconductor	DI water/Si	0.4	0.3	0.05	-	-
	Water/n-Si	0.3	0.64	-	-	2.3×10^{-3}
	Si/water	1	0.7	-	2.5×10^{5}	8×10^{-3}
Surface contact	Si/stainless	0.02	20	1	5000	0.02
	n-Si/p-Si	0.35	0.58	1	1×10^{6}	1.2×10^{-3}
	n-Si/Al	0.6	10	3	-	0.5
	Carbon aerogel /Si	2	15	0.785	1.46×10^{5}	4.76
	Si/AlN/MoS_2	5.1	5.6	0.0005	3.6×10^{5}	6.5
	Black phosphorus/AlN/Si	6.1	6.2	0.0005	4.5×10^{5}	10
	This work	130	15	1	1×10^{7}	280

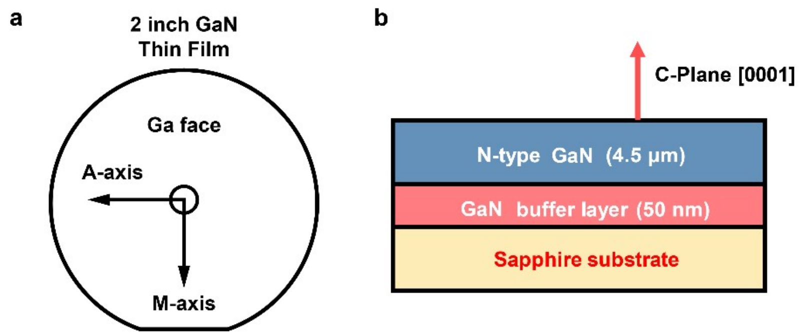

Fig. S1. The structure of the GaN thin film. (a) Crystal plane orientation (b) Epitaxial wafer structure of n-type GaN.

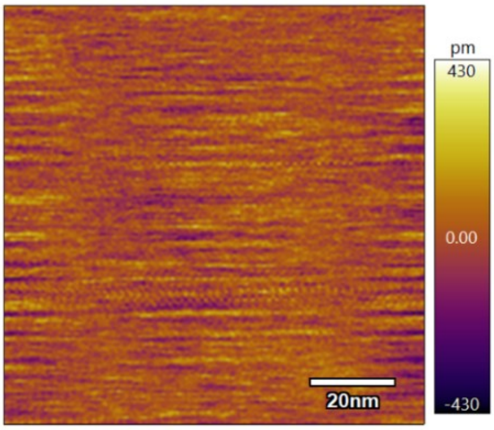

Fig. S2. AFM topographic images of n-GaN.

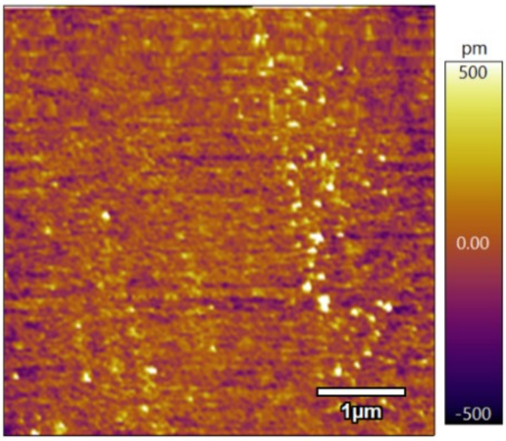

Fig. S3. AFM topographic images of p-Si.

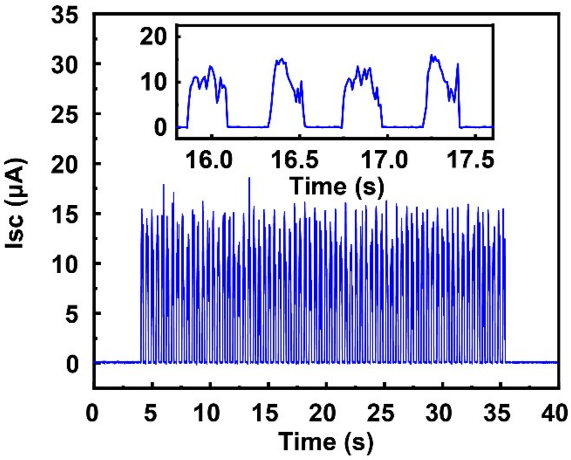

Fig. S4. The short circuit current of SDC-TENG.
Inset: partial magnified view of the current.

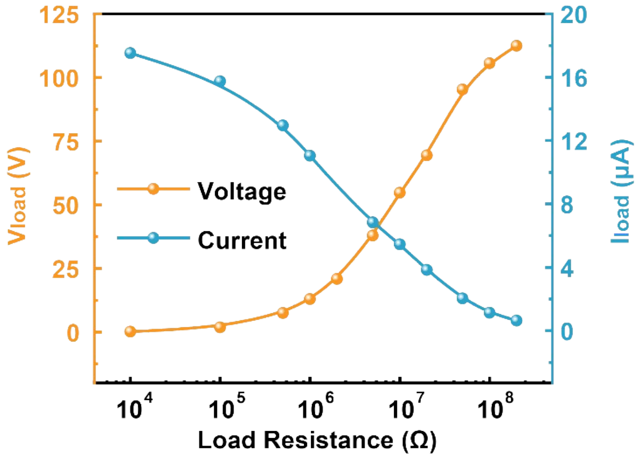

Fig. S5. The Impedance-matching curve of SDC-TENG.

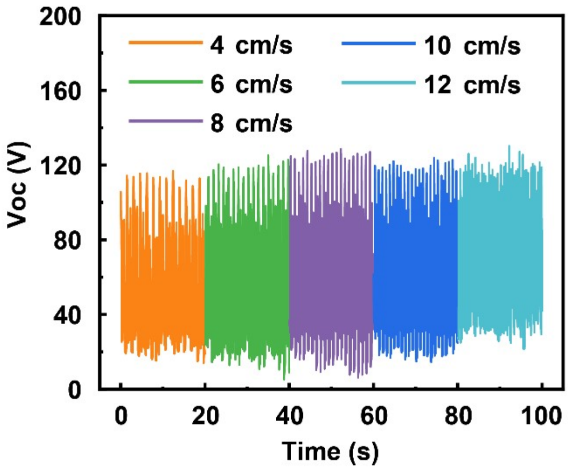

Fig. S6. The original curve of open circuit voltage
for SDC-TENG with different speeds.

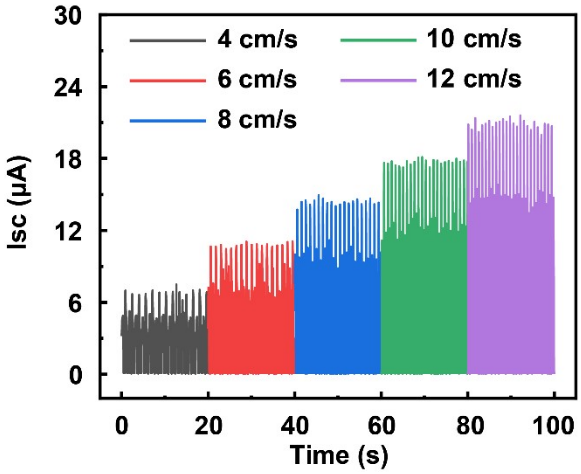

Fig. S7. The original curve of short circuit current for SDC-TENG with different speeds.

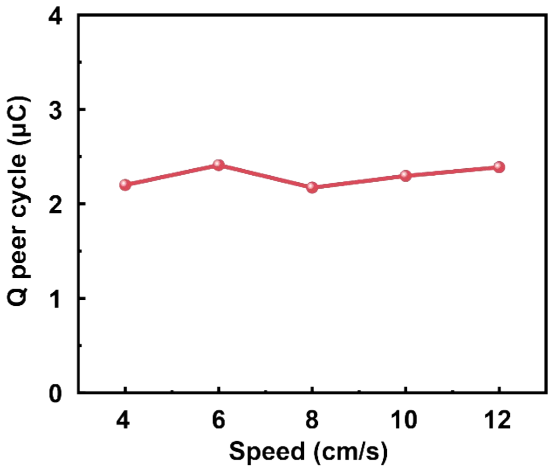

Fig. S8. The transfer charge in one cycle of SDC-TENG under different speeds.

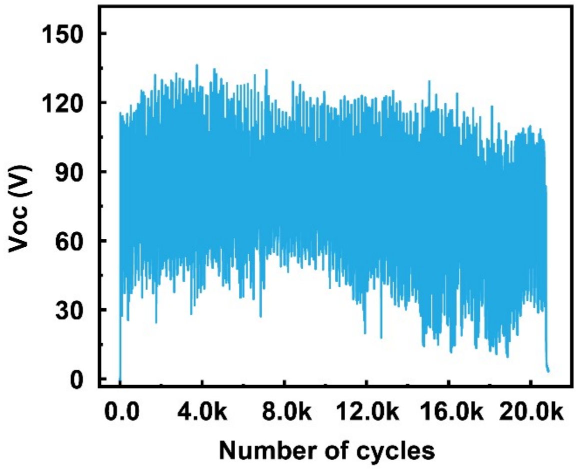

Fig. S9. The original waveform of the open circuit voltage
for SDC-TENG over 20,000 cycles.

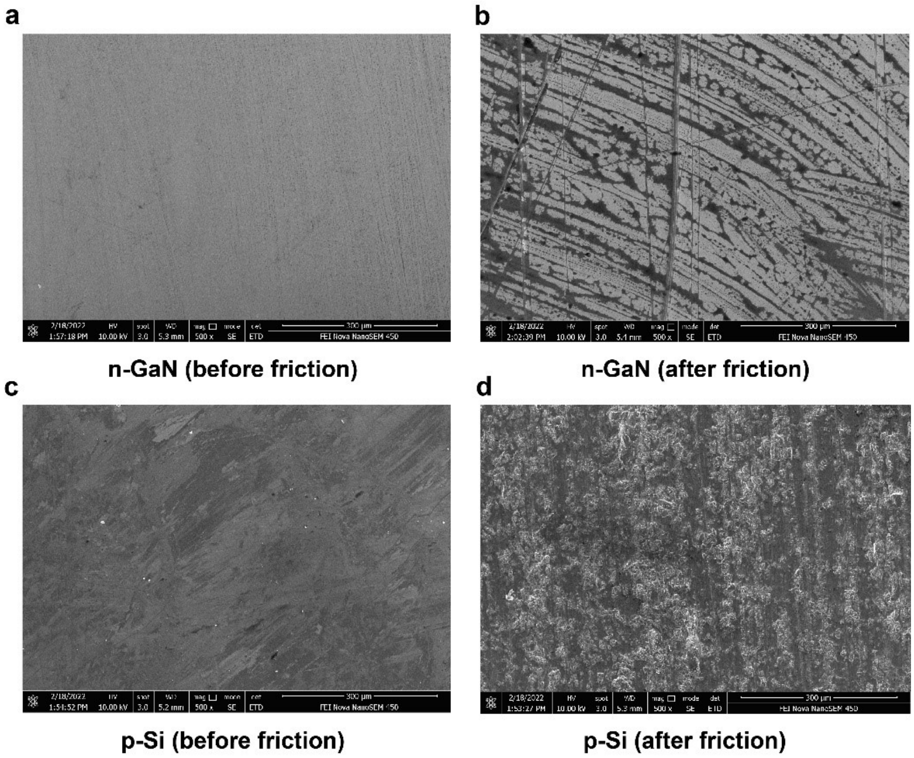

Fig. S10. The SEM morphology of n-GaN and p-Si
before and after long-term friction.

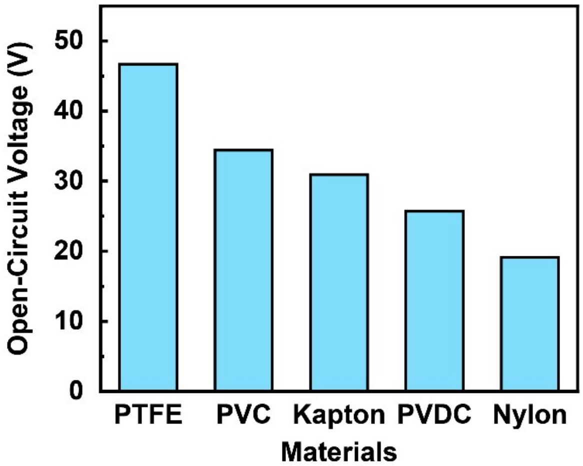

Fig. S11. The open circuit voltage of Polymer-TENG with different materials

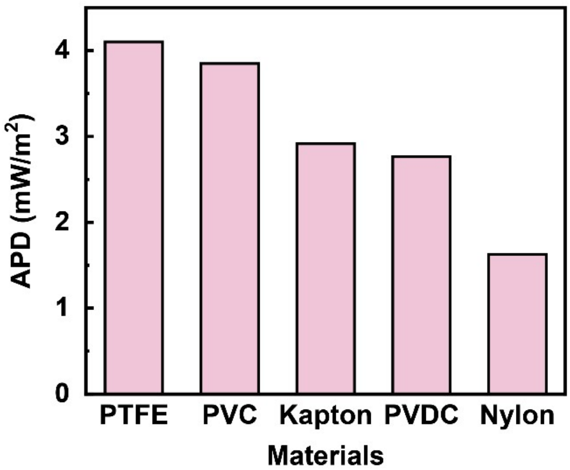

Fig. S12. The average power density (APD) of Polymer-TENG with different materials.

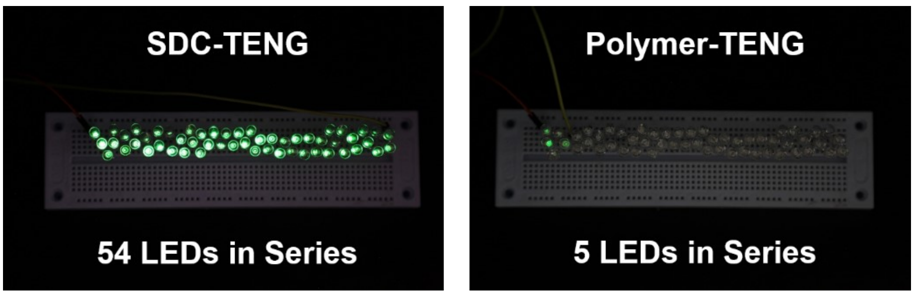

Fig. S13. Comparison of the number of LED Illuminated by SDC-TENG and Polymer-TENG in the centimeter-level (2 cm^2).

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