Supporting Information

Highly sensitive self-powered ammonia gas detection enabled by rational designed PANI/commercial cellulosic paper based triboelectric nanogenerator

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Figures

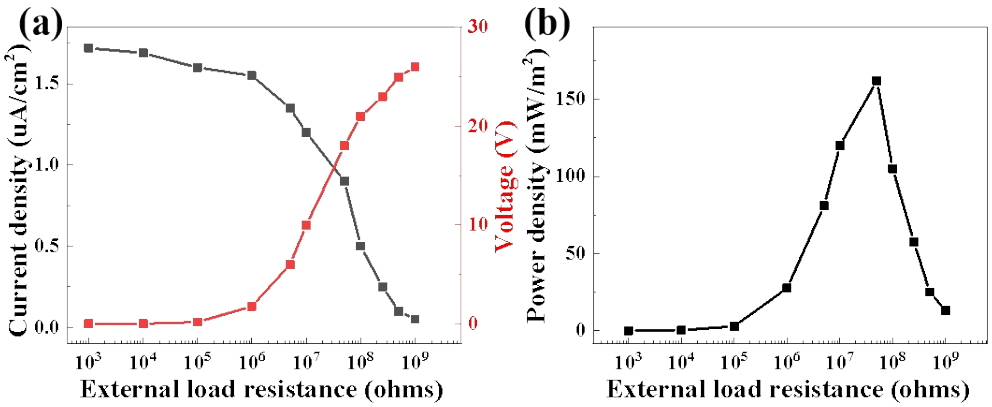

Fig. S1. (a) Output voltage and current density of the PC-TENG, (b) The corresponding power density of PC-TENG with different loads.

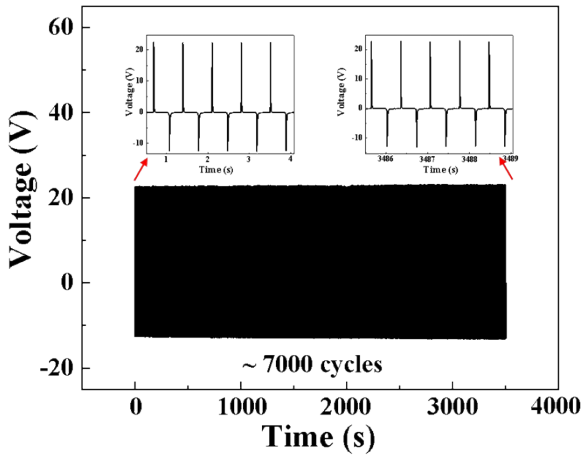

Fig. S2. Stability test of the PC-TENG.

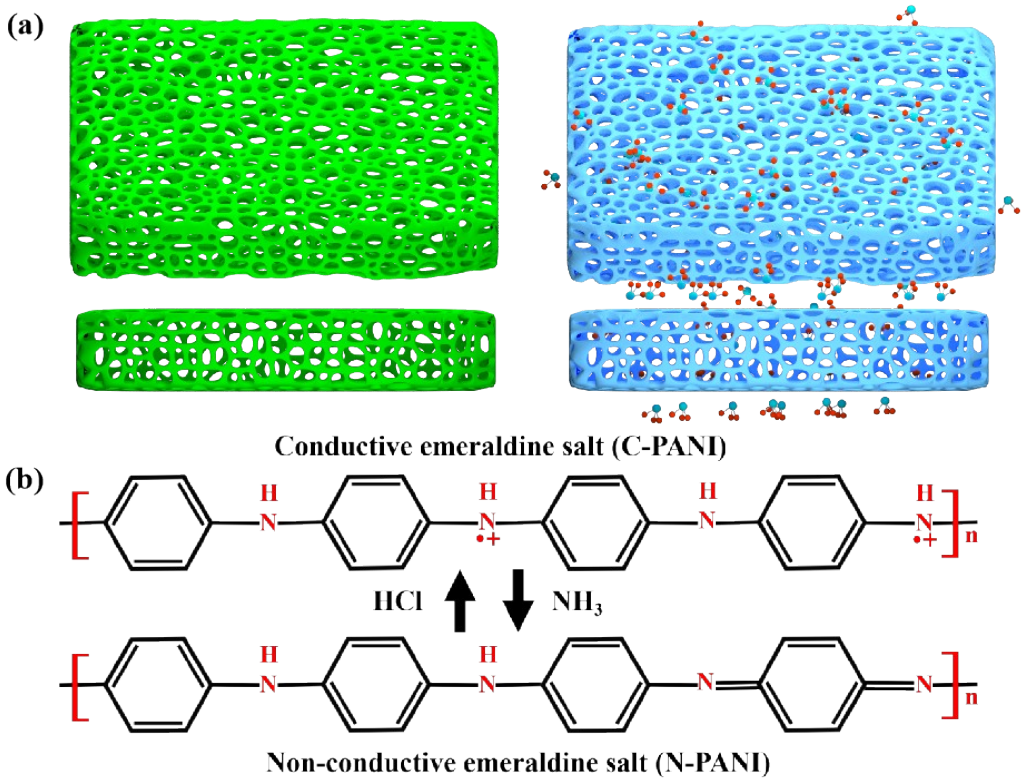

Fig. S3. (a) Illustration of NH_3 sensing mechanism in TENG system. (b) Protonation and deprotonation processes of N-PANI and C-PANI in HCl and NH_3 atmospheres.

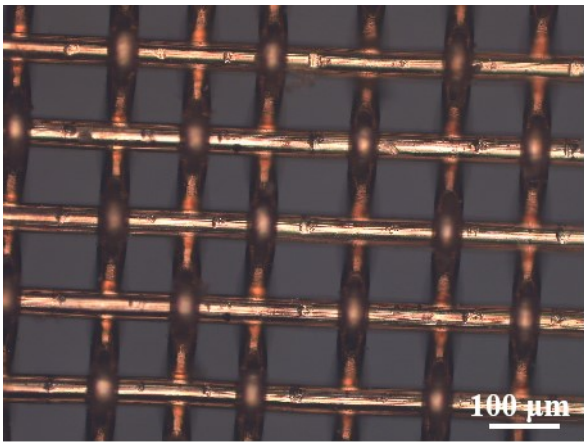

Fig. S4. Optical microscope image of the copper mesh.

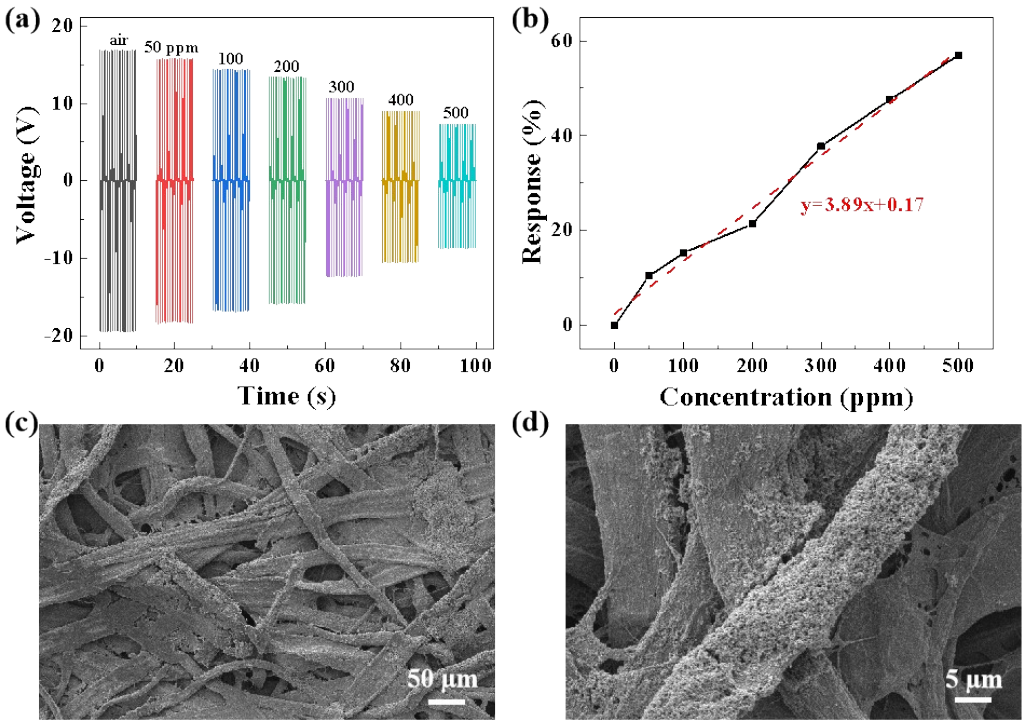

Fig. S5. (a) Voltage response changes of A4 paper with different NH_3 concentrations. (b) SEM images of A4 paper.

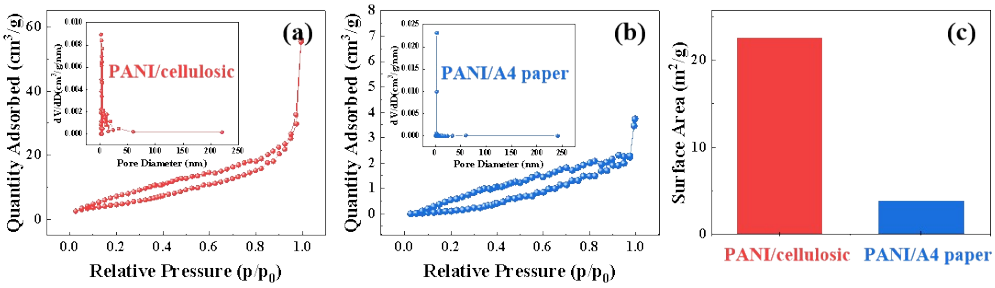

Fig. S6. N_2 adsorption/desorption isotherms and pore size distributions of (a) PANI/nitro-cellulosic paper, (b) PANI/A4 paper, respectively. (c) BET surface areas of PANI/nitro-cellulosic paper and PANI/A4 paper.

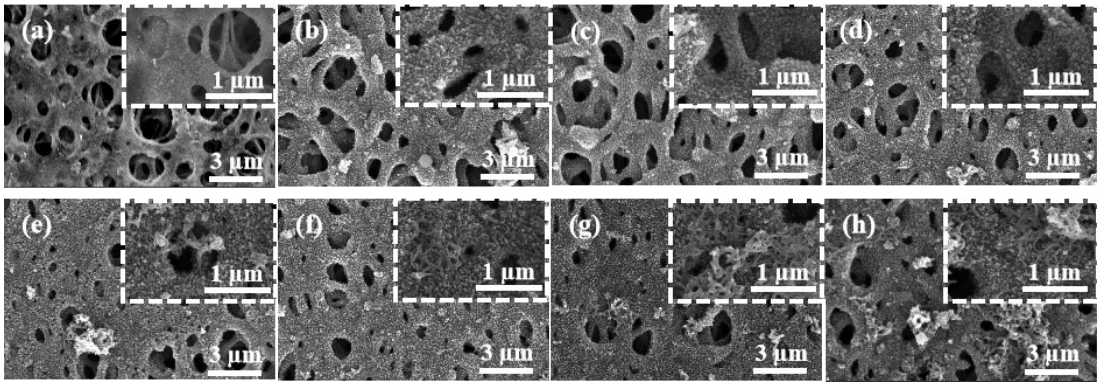

Fig. S7. SEM images of PANI/nitro-cellulose with different polymerization times.

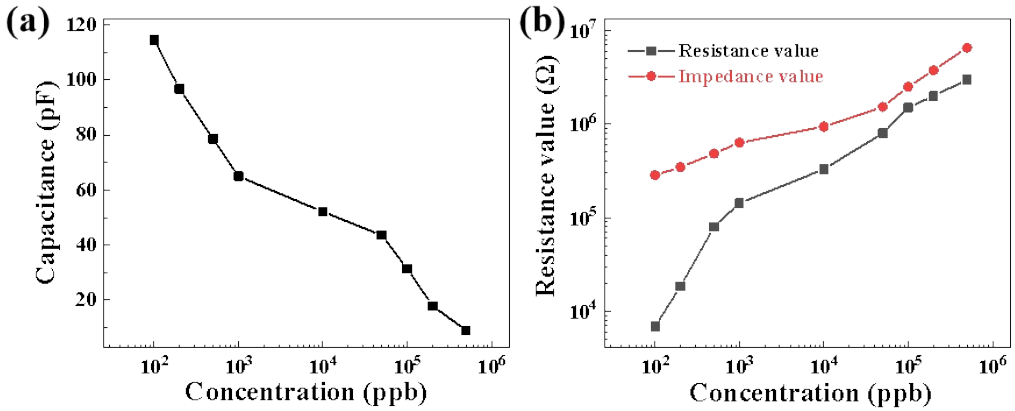

Fig. S8 (a) Capacitance variation and (b) impedance variation of the PC-TENG when it exposed to NH_3 with the range of 0.1-500 ppm.

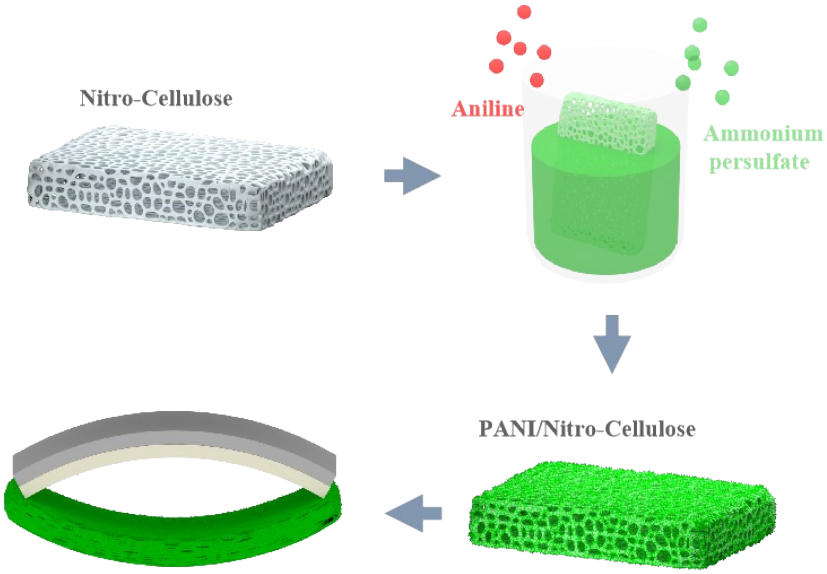

Fig. S9. The fabrication process diagram of PC-TENG based on PANI/nitro-cellulose material.

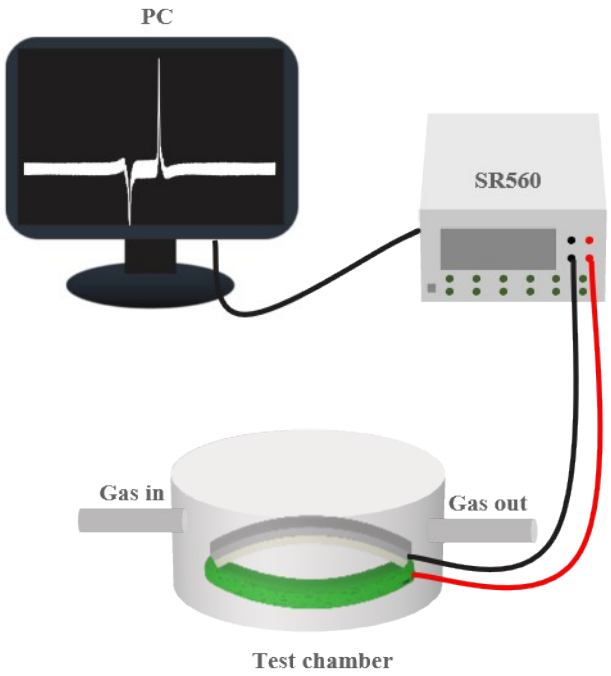

Fig. S10. Test flowchart for Self-powered ammonia sensing.

Table S1

Journal	Detection range (%/ppm)	Sensitivity (%/ppm)	Response time (s)	Recovery times (s)	Sensor/TENG	Ref.
Adv. Sci.2022, 9, 2203428	10–120	0.47	12	14	Integration	1
Nano Energy,83 (2021) 105833	50–500	14	9	11	Integration	2
Nano Energy, 49 (2018) 31–39	500–2000	0.025	40	225	Integration	3
Nano Energy, 58 (2019) 312–321	0.1–1 1–25	13.6 1.11	109	233	Integration	4
Adv. Mater. Technol. 2021, 2100310	0–400	0.07366			Integration	5
Sci. China Mater. 2019, 62(10): 1433–1444	50-250	0.18	13	12	Integration	6
Nano Energy, 63 (2019) 103829	0.2–1 2–10	20.13 1.13	155		Integration	7
This work	**0.1–1 ppm** **1-50 ppm** **50-500 ppm**	**45.41** **15.17** **5.46**	**32 s**	**365 s**	**Integration**	/