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Supplementary Information

A 0.05 V driven ammonia gas sensor based on an organic diode with a top porous layered electrode and the air-stable sensing film

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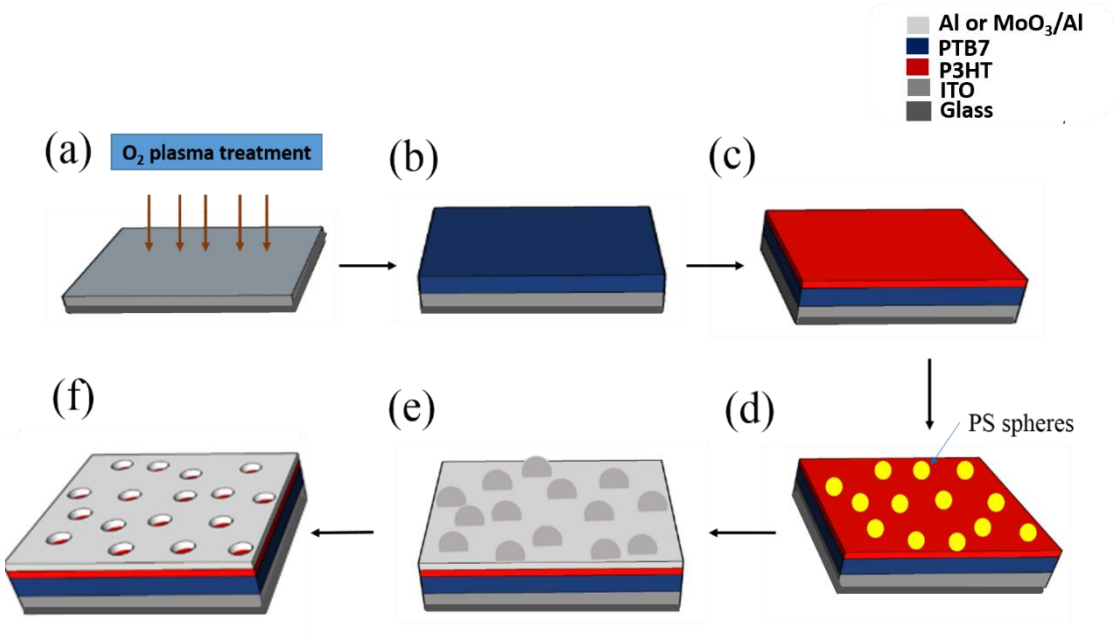

Fig. S1 Schematic illustration of fabrication process. (a) An ITO substrate was treated by the O_2 plasma. The sensing layer (PTB7) and the surface modification layer (P3HT) are deposited in (b) and in (c), respectively. (d) The PS spheres were absorbed onto the P3HT. (e) top electrode was thermal evaporated. (f) After removing PS spheres by 3M scotch tape, the top electrode with nanometer pores is formed.

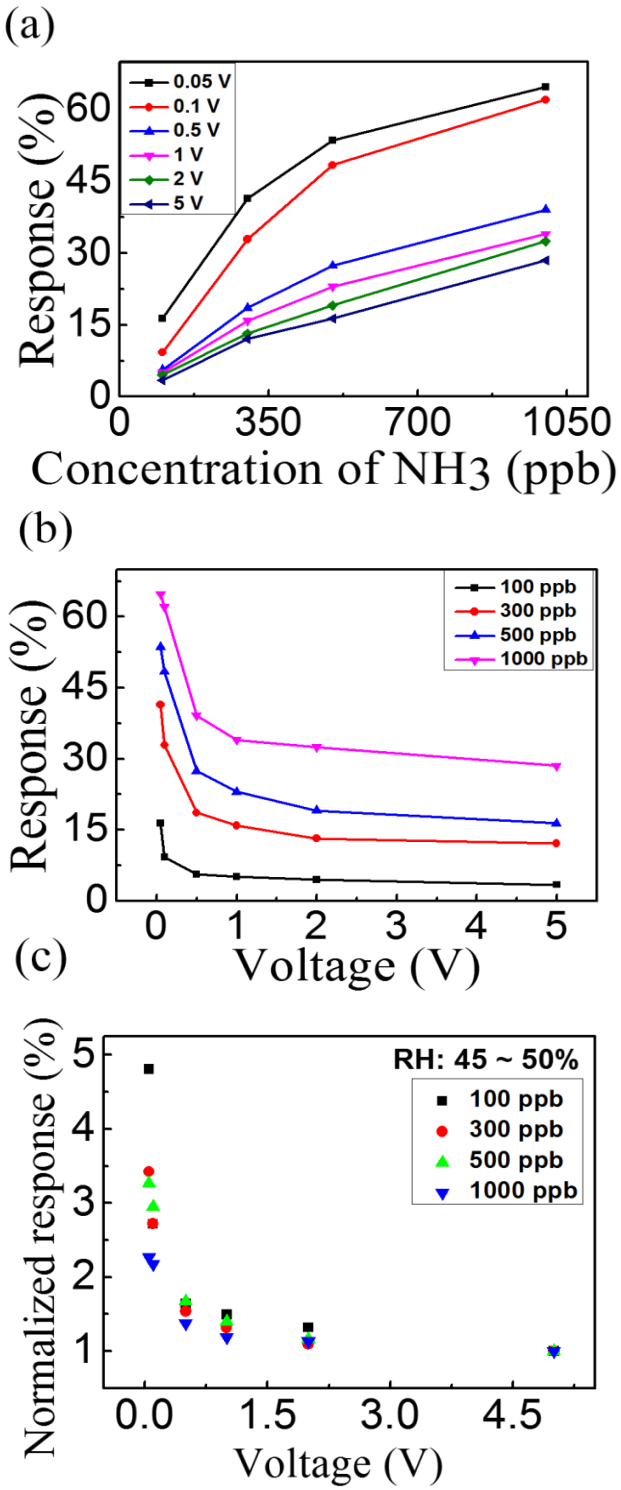

Fig. S2 Without NaOH tube, RH = 45-50%. (a) The sensing response as a function of ammonia concentration at different operating voltages (0.05 V to 5 V). (b) The sensing response as a function of operating voltage at various ammonia concentration. (c) The normalized sensor response, which is the response at different voltages divided by the response at 5 V, as a function of operating voltage with different ammonia concentration.

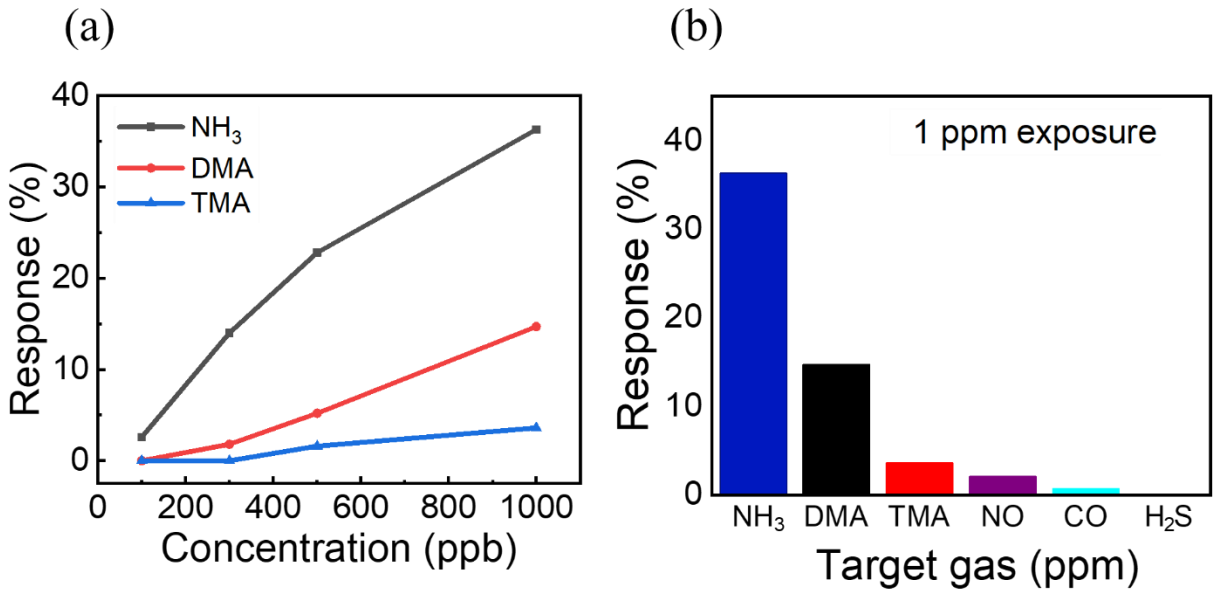

Fig. S3 Selectivity test of proposed sensor with MoO3/Al electrode. (a) The sensing response as a function of amine gases (NH_3, DMA, and TMA) at 0.5 V. (b) The sensing response as a function of different target gases (NH_3, DMA, TMA, NO, CO, and H_2S) at 1 ppm.

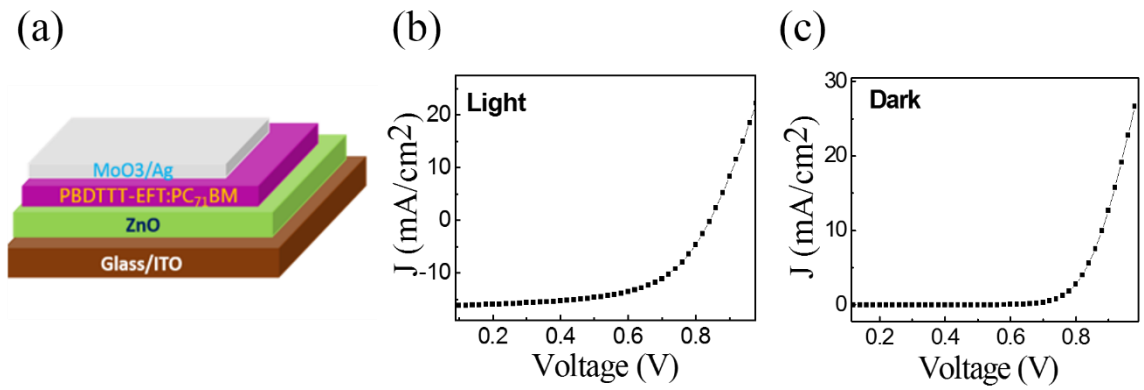

Fig. S4 (a) The schamatic diagram of OPV. (b) and (c) are the current density as a function of voltage under light and in dark, respectively.

Table S1 The key parameters of the fabricated OPV

Efficiency (%)	J_{sc} mA/cm^2	V_{oc} (V)	Fill factor (%)
8.223	16.395	0.842	0.596

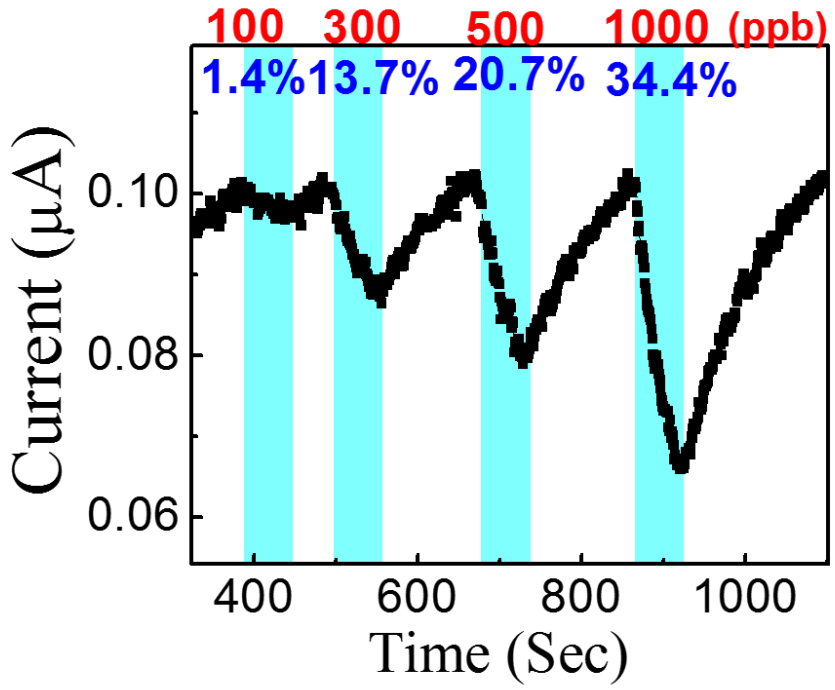

Fig. S5 The real time sensing curve for the OPV-directly-biased PTB7 sensor without applying external bias.

Notes and references

1 L.Y. Chang, M.Y. Chuang, H.W. Zan, H.F. Meng, C.J. Lu, P.H. Yeh and J.N. Chen, *ACS Sens*, 2017, **2,** 531-539.

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3 M. Y. Chuang, Y.T. Lin, T.W. Tung, L.Y. Chang, H.W. Zan, H.F. Meng, C.J. Lu and Y.T. Tao, *Sens and Actuators: B*, 2018, **260,** 593-600.