

## Supplementary Information for

### Highly sensitive polyaniline-coated fiber gas sensors for real-time monitoring of ammonia gas

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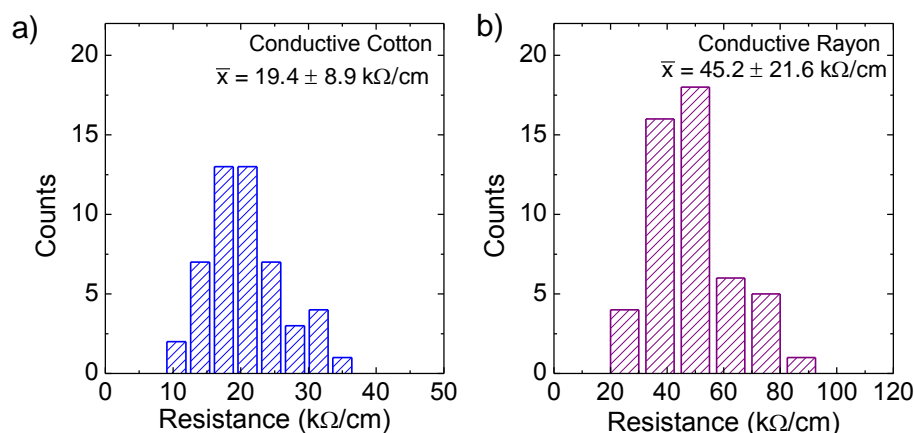
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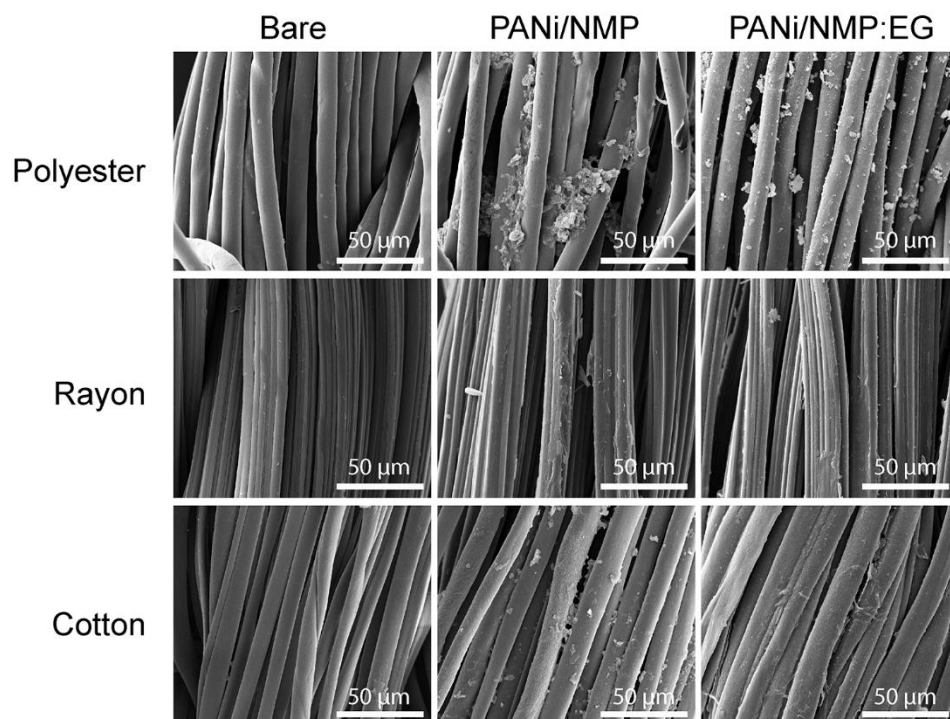
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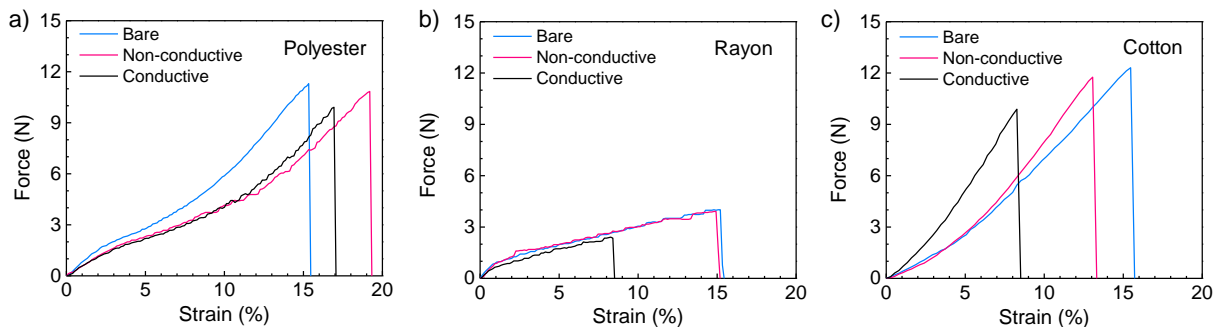
**Fig. S1** Histograms of a) conductive cotton and b) conductive rayon without adding ethylene glycol.



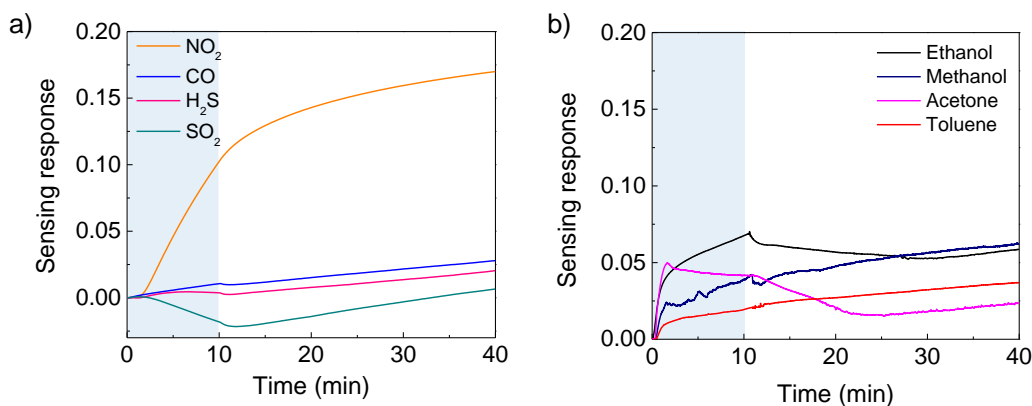
**Fig. S2** Low magnification SEM images of bare and coated yarns.

**Table S1** FTIR table of functional group and its wave number.

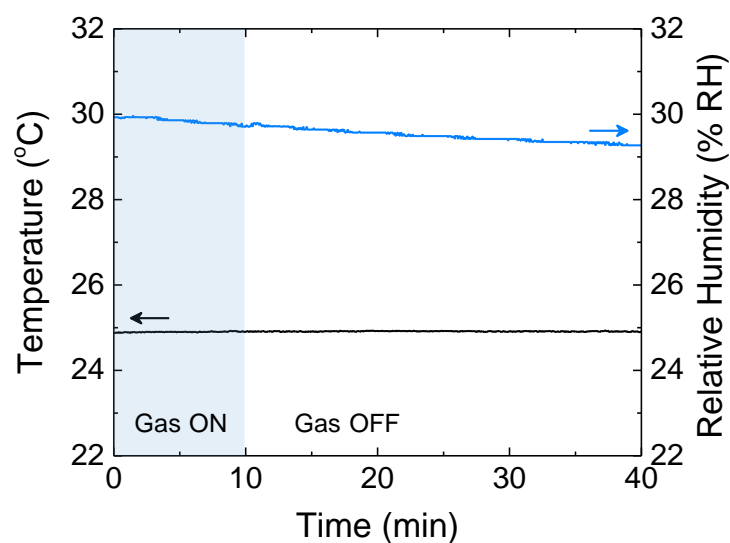
Wavenumber (cm <sup>-1</sup> )	Assignments
3332, 3333	O-H stretching
2968	C-H stretching
2917, 2892	C-H symmetric stretching
1714	C=O stretching
1643,1633	O-H bending
1594,1593,1592	C=N Stretching of quinoid ring (polyaniline)
1505	Aromatic ring C=C stretching
1504, 1498,1496	C-N stretching of benzenoid ring (polyaniline)
1424, 1408, 1365, 1364, 1338	C-H bending
1313	O-H in plane bending
1240	Ester's C-O stretching
1155, 1025, 1016, 893	C-O stretching in C-O-C and C-O-H fragments
1094	C-O stretching
871	Aromatic ring C-H bending
723	C-H bending (C-H rocking in C-CH <sub>2</sub> -fragment)
667,607,609	O-H out-of-plane bending



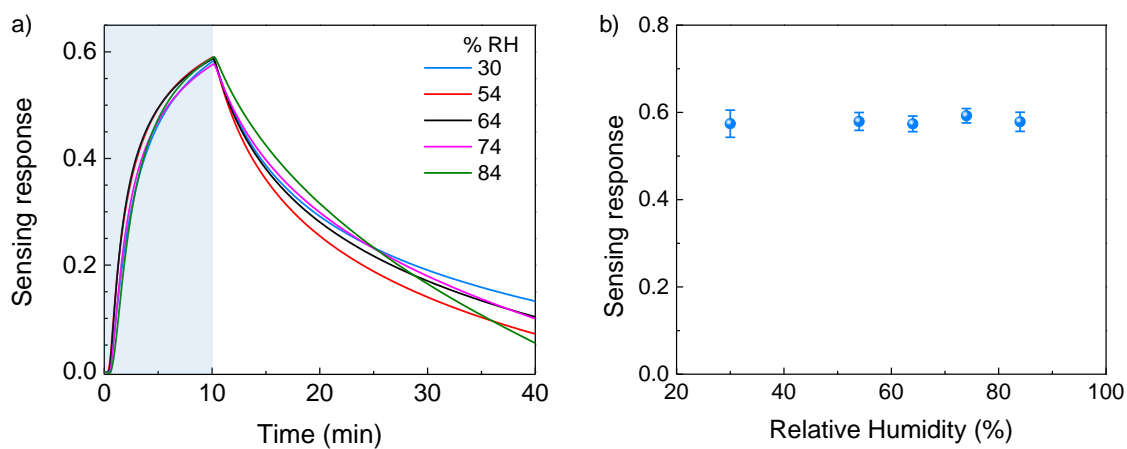
**Fig. S3** Relating force and strain of bare yarns, coated non-conductive form of PANi (PANi-EB) and conductive form of PANi (PANi-ES) on a) polyester, b) rayon and c) cotton yarns.



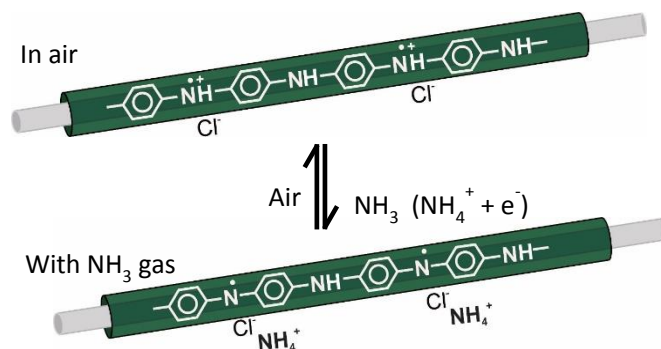
**Fig. S4** The sensing response ( $S=(R_g-R_0)/R_0$ ) of a) toxic gases and b) common solvents under conductive polyester yarn based gas sensor.



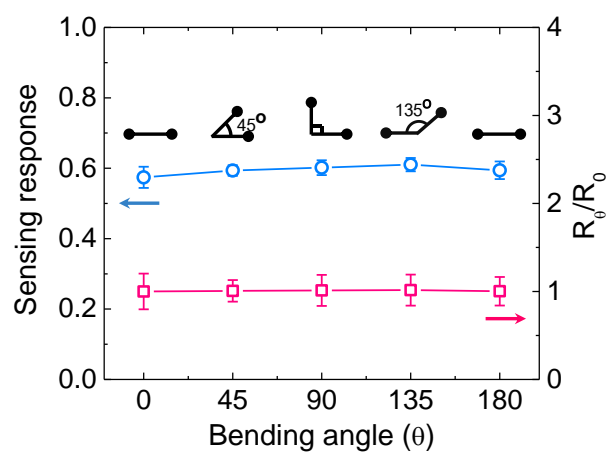
**Fig. S5** Operating temperature and relative humidity of conductive polyester sensor during exposure to 50 ppm of  $\text{NH}_3$  gas for 10 mins and cleaning with synthetic air for 30 mins.



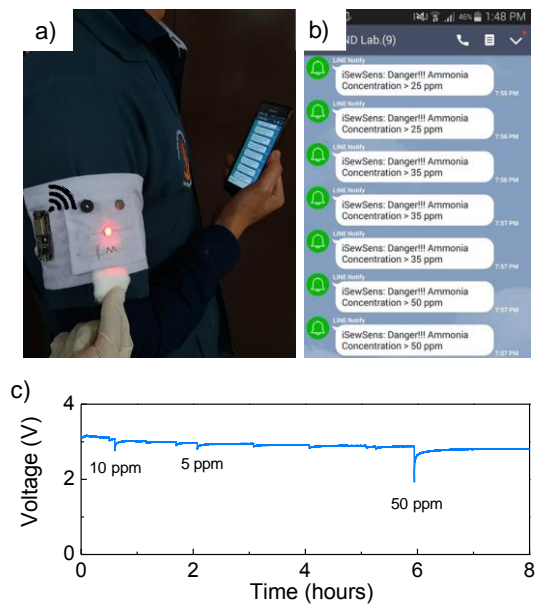
**Fig. S6** a) Sensing response as a function of time of conductive polyester sensor under 50 ppm ammonia exposure and under different relative humidity environment. b) Maximum sensing response of conductive polyester yarn with different relative humidity operation.



**Fig. S7** Schematic of ammonia sensing mechanism.



**Fig. S8** Measuring sensing response (blue color) and relative sensor resistance (magenta color) under different bending angle ( $R_\theta$  is sensor resistance at specific bending angle and  $R_0$  is sensing resistance before exposure to the  $\text{NH}_3$  gas).



**Fig. S9** a) Photograph image of conductive polyester yarn sensor as an armband. b) The gas sensor results and alarm messages on mobile application. c) Real-time voltage measurement (drop and recovery) during exposure to different concentration of ammonia gas.