

Supplementay Materials

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Materials and Reagents:

1,3,5-tris(4-aminophenyl) benzene (TAPB (99.5%)) and 4,4'-Biphenyldicarbaldehyde (BPDA (99.5%)) were purchased from Shanghai Tensus Biotech Co., Ltd. (Shanghai, China). Benzaldehyde (C₇H₆O (99%)), DMSO (99%), NMP (99%), toluene (C₇H₈ (99.5%)) and acetonitrile (C₂H₃N (99%)) were purchased from Shanghai Boer Chemical Reagents Co., Ltd. (Shanghai, China). Ethyl acetate (C₄H₈O₂ (99.5%)) and methanol (CH₄O (99.5%)) were purchased from Tianjin Xinbote Chemical Co., Ltd. (Tientsin, China). 1,4-Dioxane (C₄H₈O₂ (99.5%)) was purchased from Tianjin Zhongyuan Chemical Reagent Co., Ltd. (Tientsin, China). 1,3,5-Trimethylbenzene (C₉H₁₂ (97%)) was purchased from Shanghai Mclean Biochemical Technology Co., Ltd. (Shanghai, China). scandium(III) trifluoromethanesulfonate Sc(OTf)₃ (99%) was purchased from Beijing Biotech Pharmaceutical Co., Ltd. (Beijing, China). Formaldehyde (CH₂O (37%)), ethylene glycol (C₂H₆O (99.9%)), acetone (C₃H₆O (99.9%)), NH₃ (25%), ethylene glycol (C₂H₆O₂ (99%)) and aniline (C₆H₇N (99.9%)) were purchased from Sinopharm Chemical Reagent Co., Ltd. (Beijing, China). Hydrogen peroxide (H₂O₂ (30%)) HCl (37%), Hexane (C₆H₁₄ (99.5%)) and HNO₃ (65%) were purchased from Aladdin Reagent Co., Ltd. (Shanghai, China). Phenol (C₆H₆O (99%)) was purchased from Tianjin Damao Chemical Reagent Factory (Tientsin, China). Trimethylamine solution (C₃H₉N (33%)) was purchased from Tianjin Kwangfu Fine Chemical Industry Research Institute (Tientsin, China).

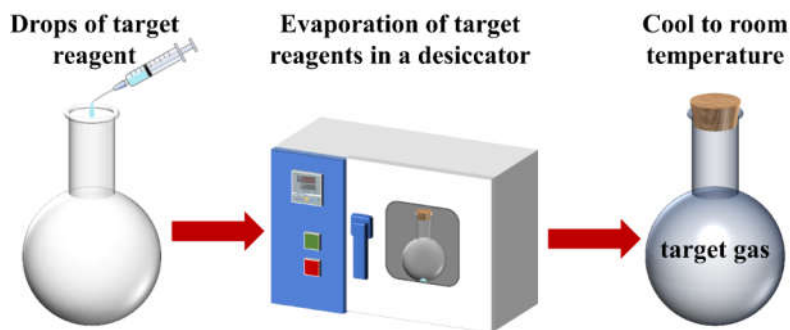


Figure S1. Target gas preparation diagram.

All target gases were prepared by thermal evaporation using the following equation:

$$Q = (V \times C \times M) / (22.4 \times D \times \rho) \times 10^{-9} \times (273 + T_R) / (273 + T_C)$$

where Q is the liquid volume of the target reagent (mL), V is the volume of the sealed experimental container (mL), C is the concentration of the prepared target atmosphere (ppm), M is the molecular weight of the target reagent, d is the purity of the target reagent (wt %), ρ is the density of the target reagent (g/cm³), T_R is the ambient temperature, and T_C is the actual temperature inside the sealed experimental container. The target gas is prepared by pumping the target liquid into a sealed experimental vessel and heating it.

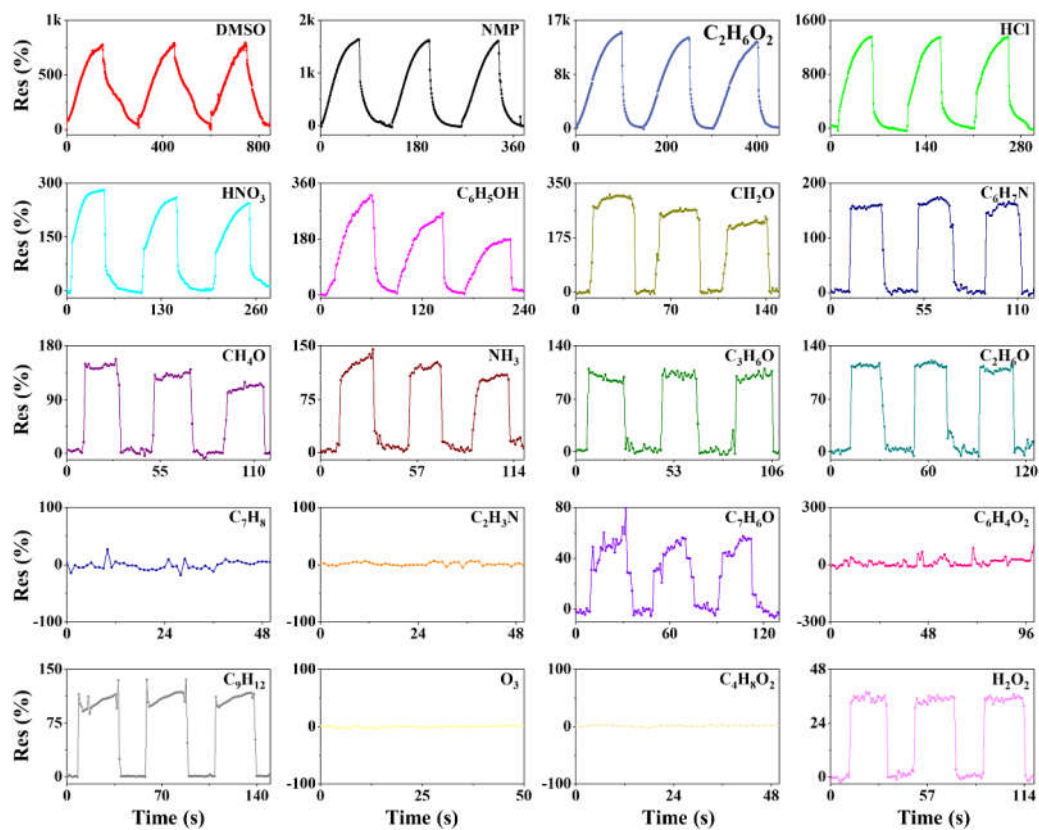


Figure S2. Response-recovery curves of COF_{TB} toward 20 different atmospheres (500 ppm).

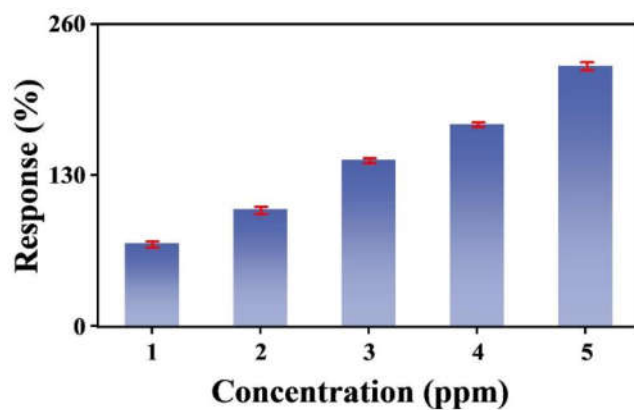


Figure S3. Histogram of averages and error bars based on three responses.

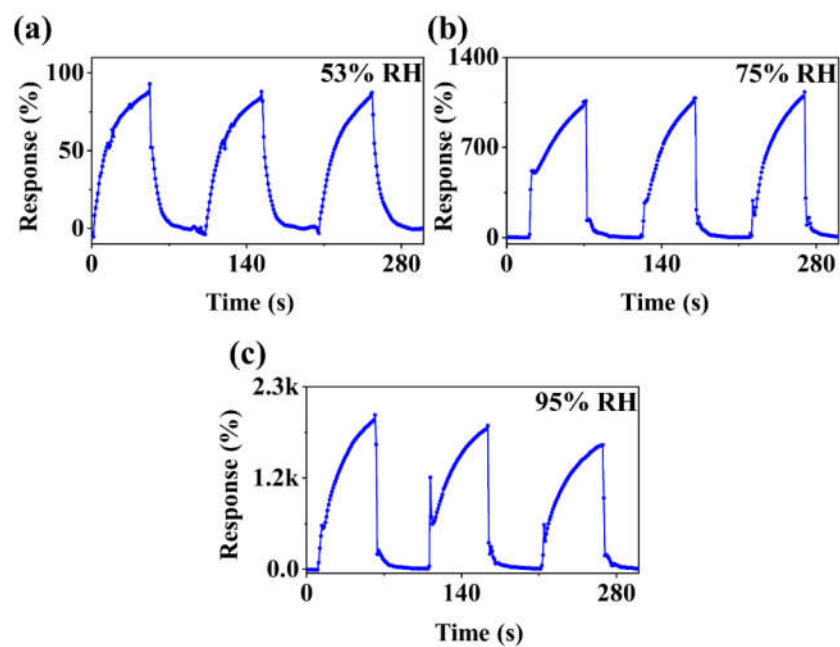


Figure S4. (a–c) Sensing curves of COF_{TB} for different humidity levels.

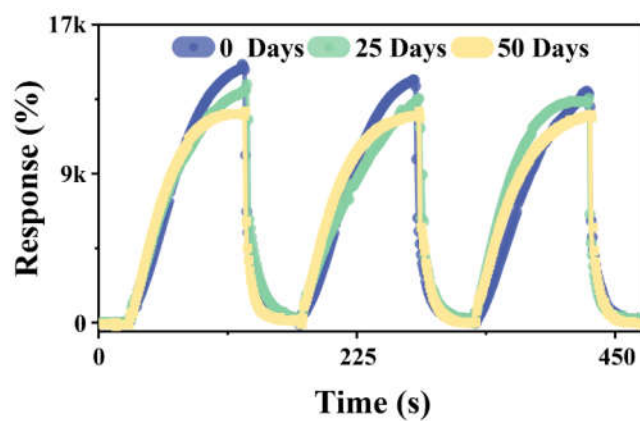


Figure S5. Long-term stability of COF_{TB} to 500 ppm C₂H₆O₂.

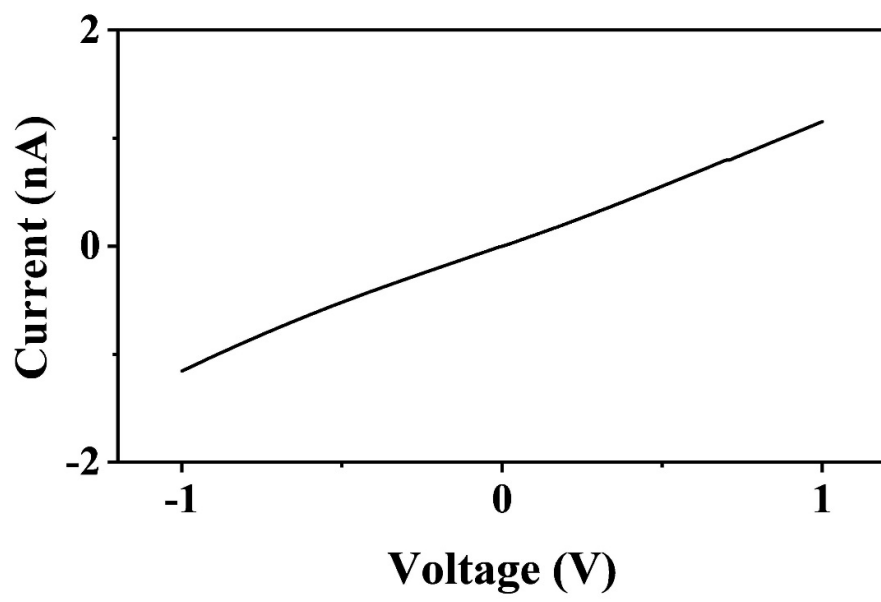


Figure S6. I-V curves of COF_{TB}.