Supporting Information

Imparting hydrophobicity to MOF on Layered MXene for the selective, rapid, and ppb level humidity-independent detection of NH_3 at room temperature

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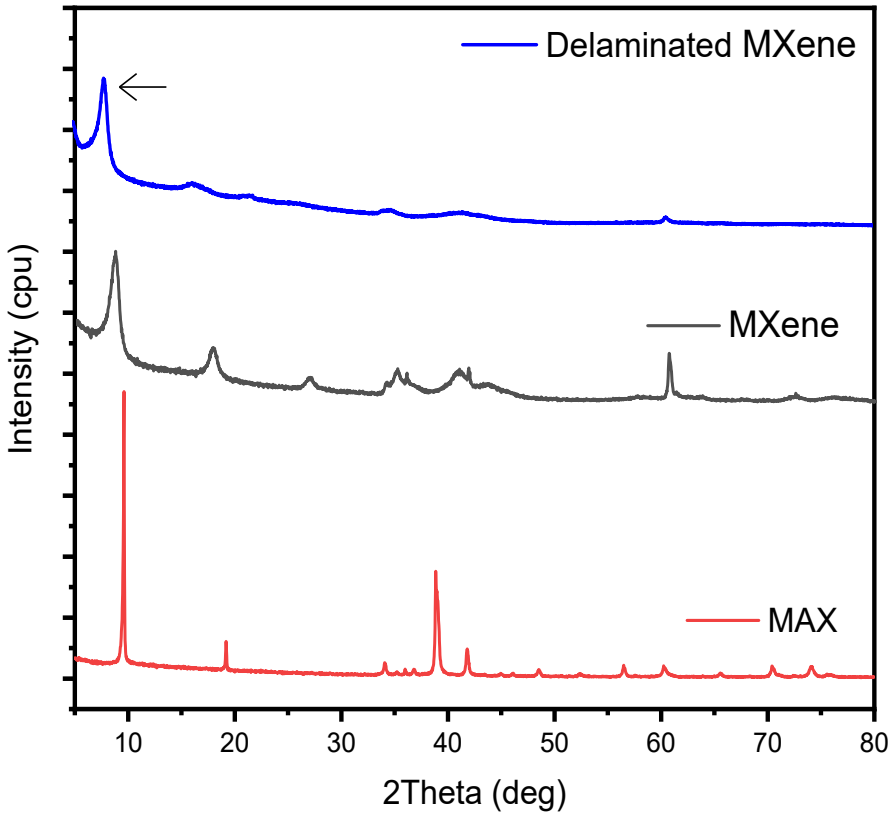

Fig. S1 The XRD spectrum of MAX, MXene and delaminated MXene.

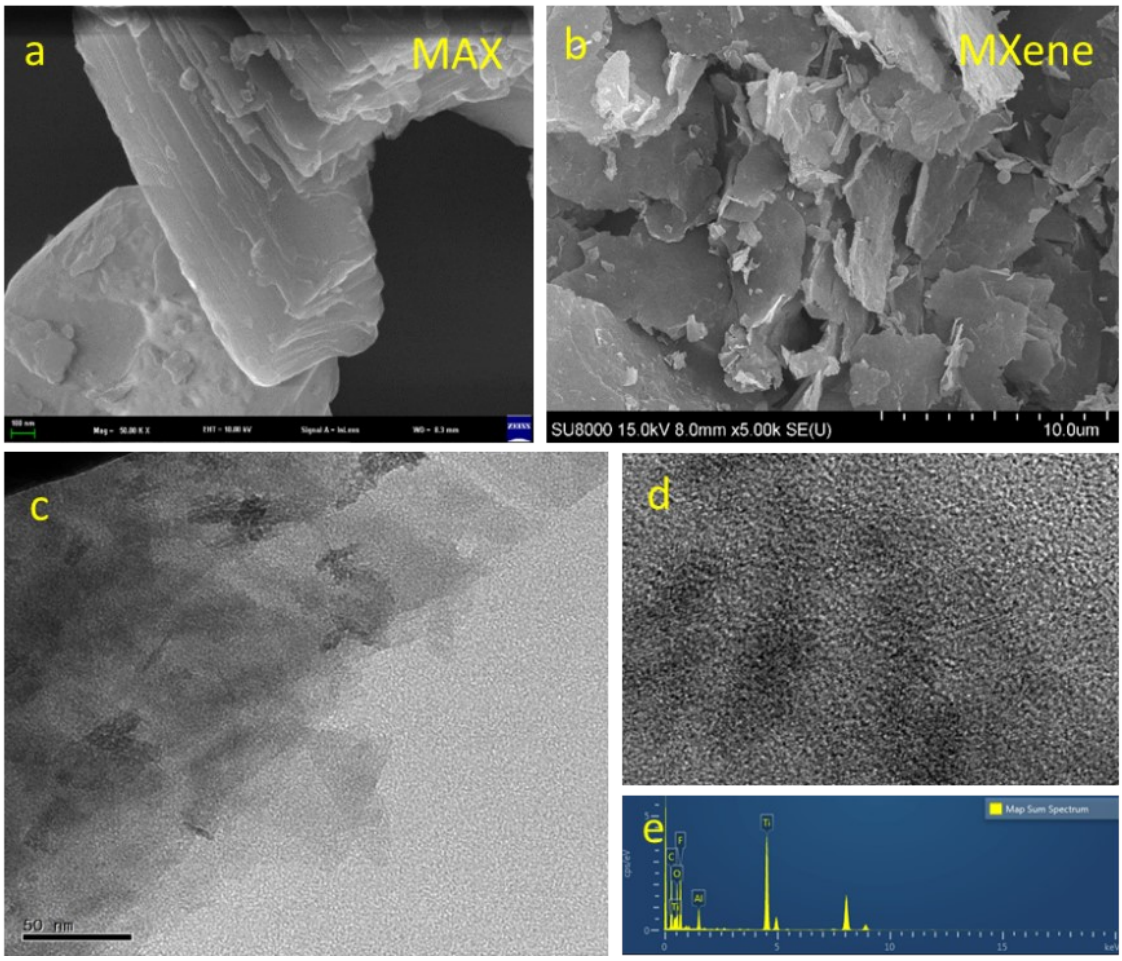

Fig. S2 SEM of (a) MAX and (b) MXene. (c-e) TEM images and EDAX spectra of the MXene nanosheets.

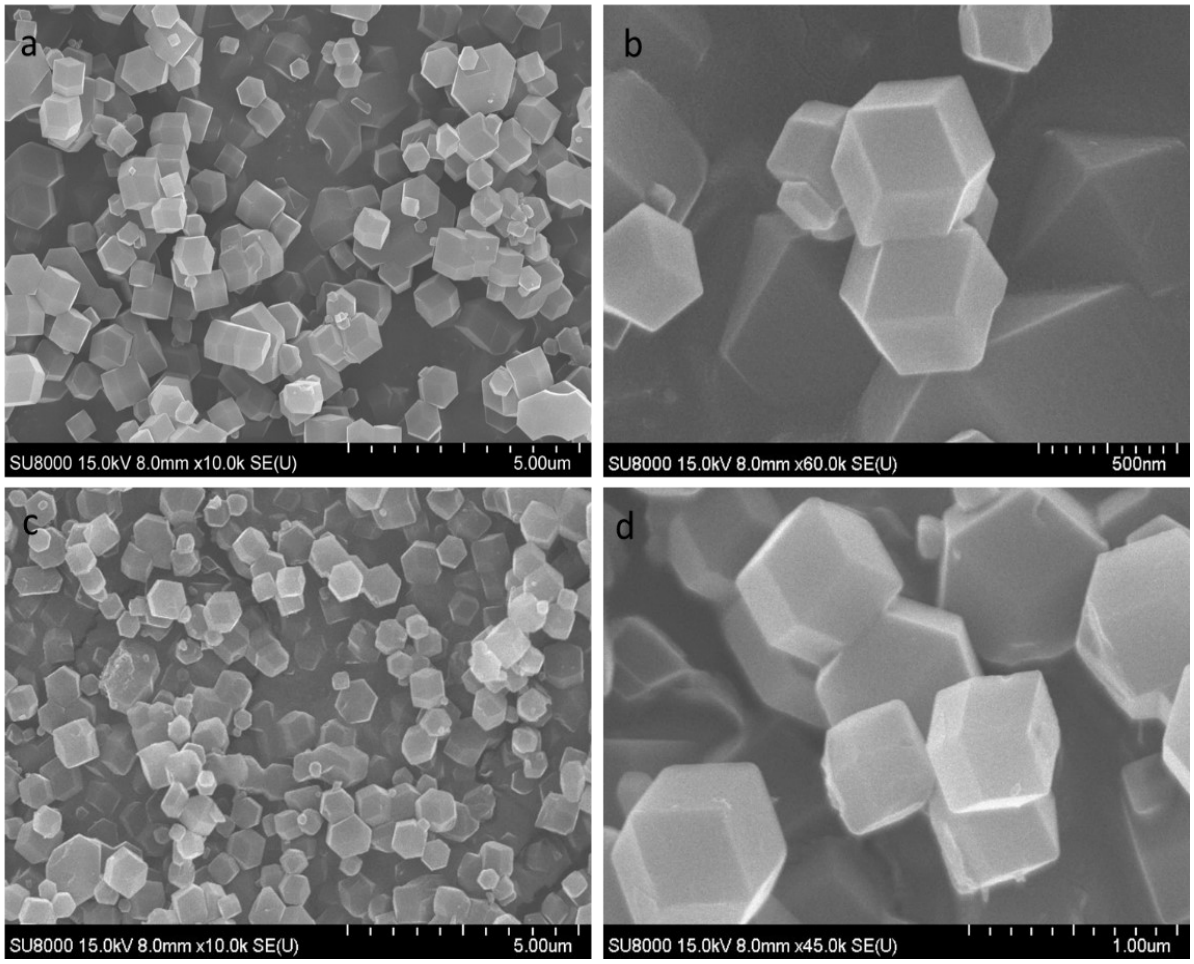

Fig. S3 SEM images of (a, b) ZIF-67 and (c, d) H-ZIF-67 nanostructures.

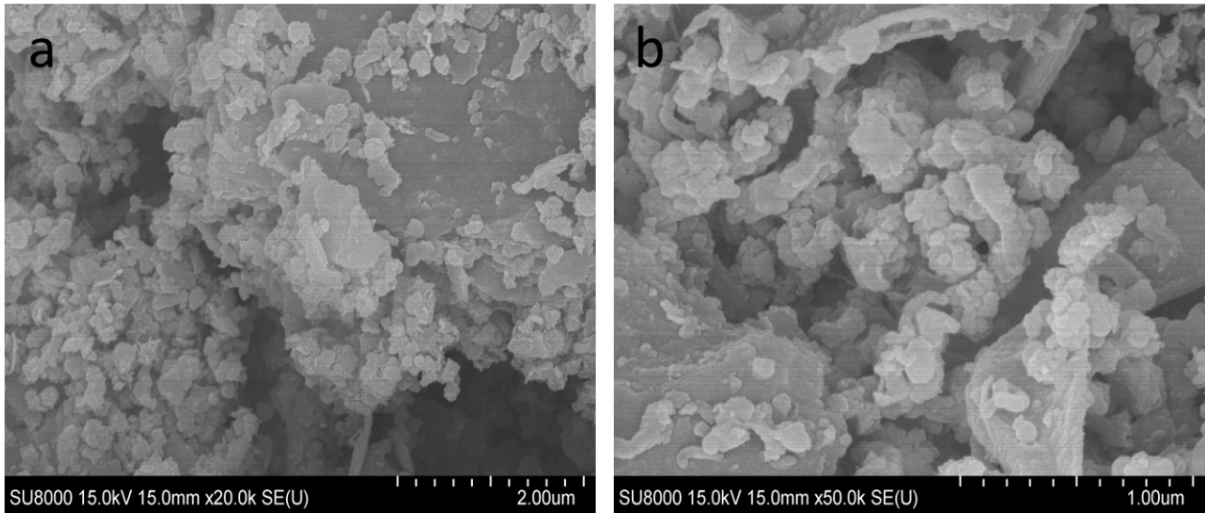

Fig. S4 SEM of ZIF/MXene composite without nucleation process.

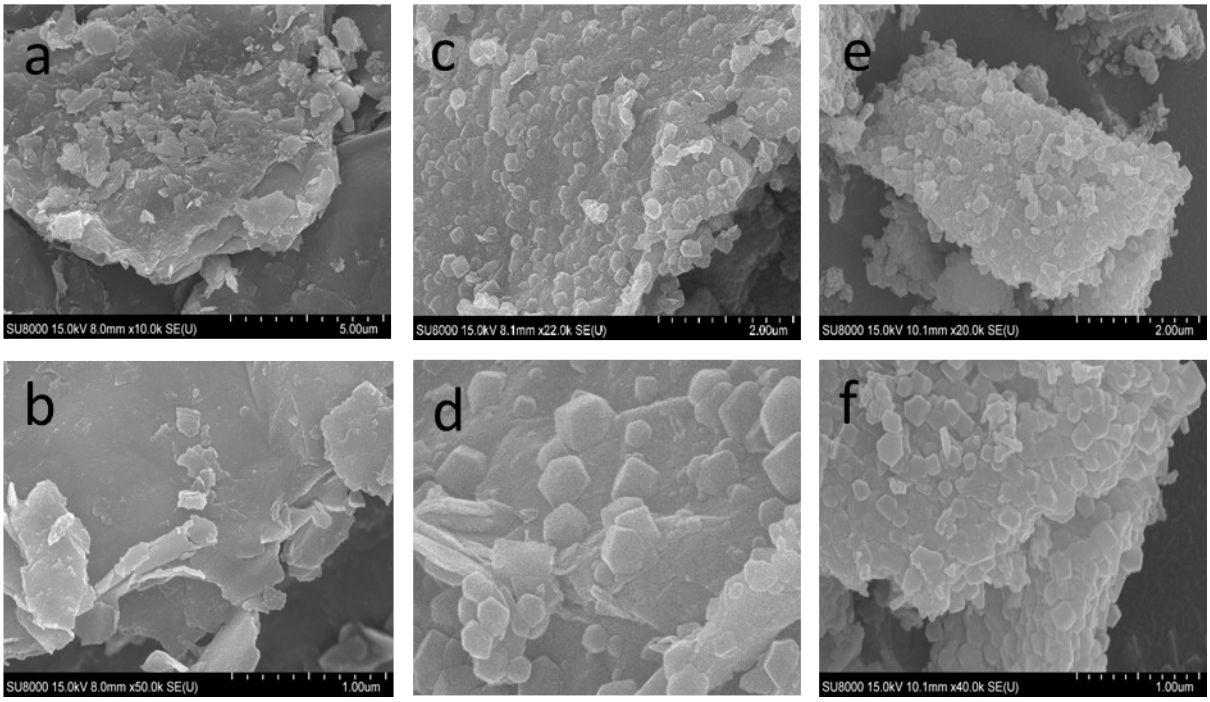

Fig. S5 SEM images of MOF loading density on MXene (a, b) 2 wt.% (c, d) 6 wt.% and (e, f) 10 wt.%.

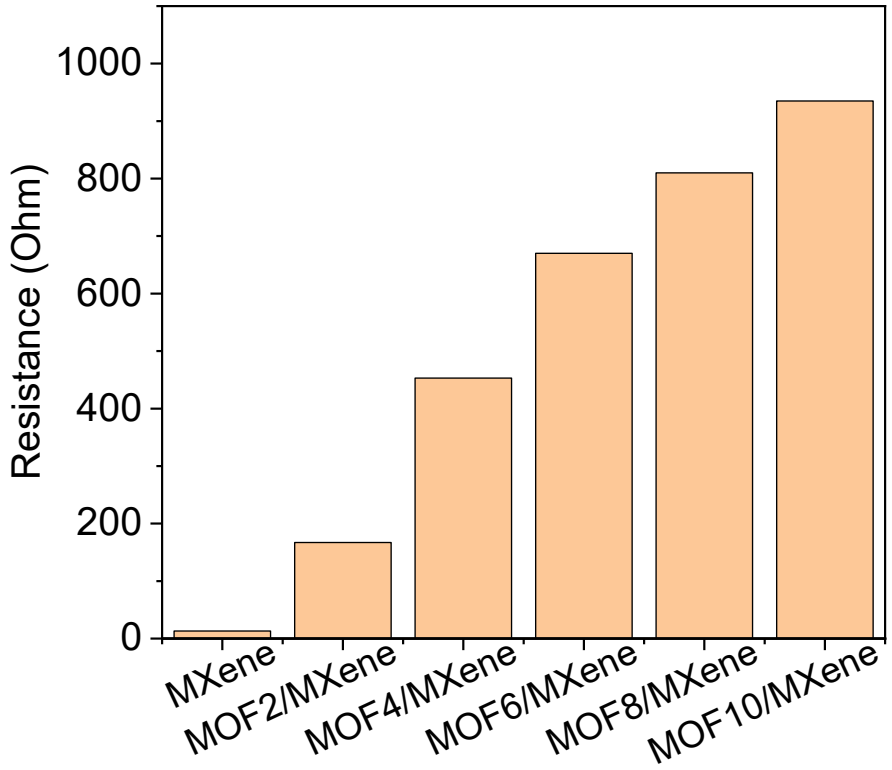

Fig. S6 Resistance of the different densities of MOF-loaded MXene at the potential difference of 1V.

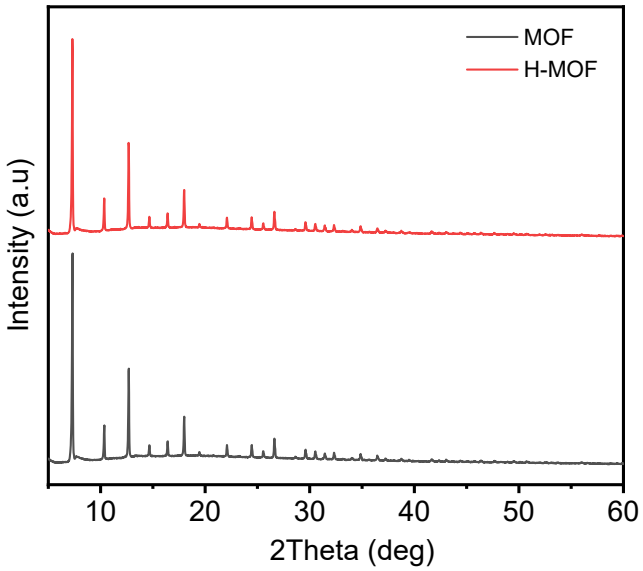

Fig. S7 XRD spectrum of MOF (ZIF-67) and H-ZIF (H-ZIF-67) nanostructures.

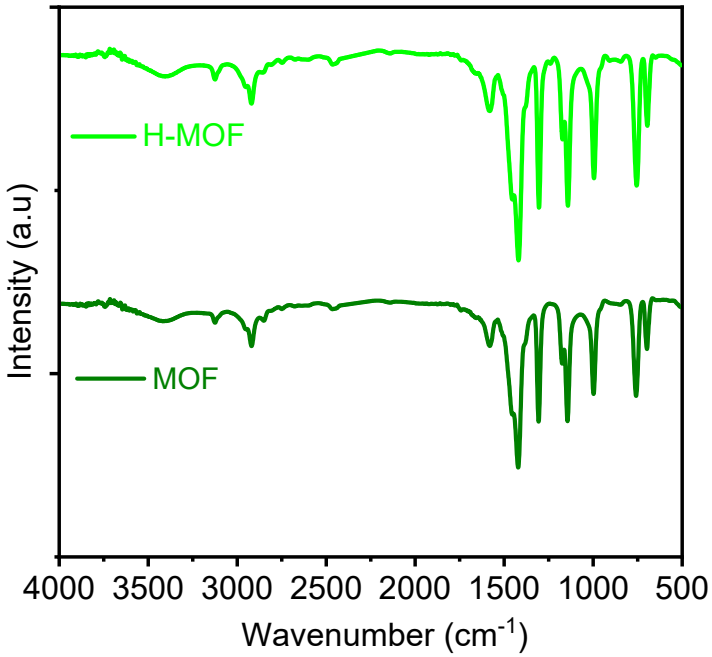

Fig. S8 FTIR spectrum of MOF and H-MOF nanostructures.

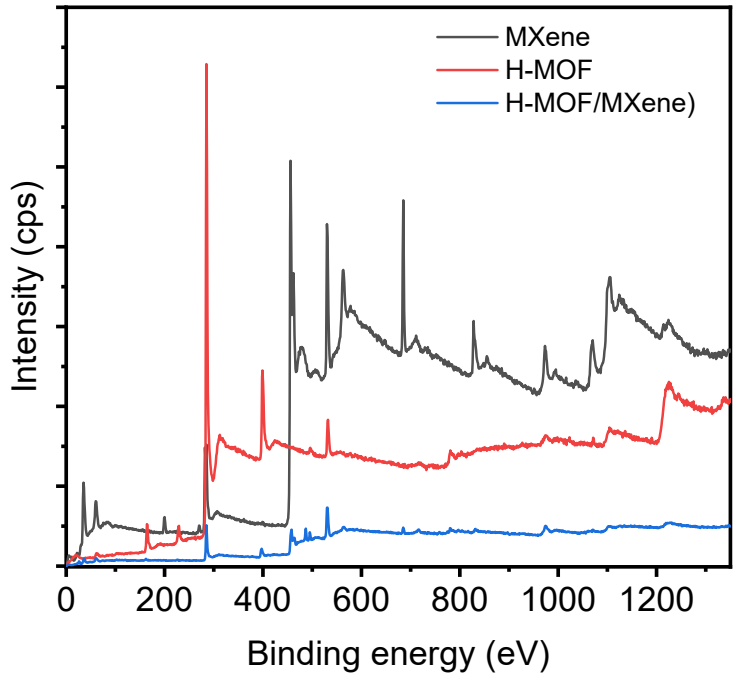

Fig. S9 XPS survey spectrum of MXene, H-MOF, and H-MOF/MXene heterostructures.

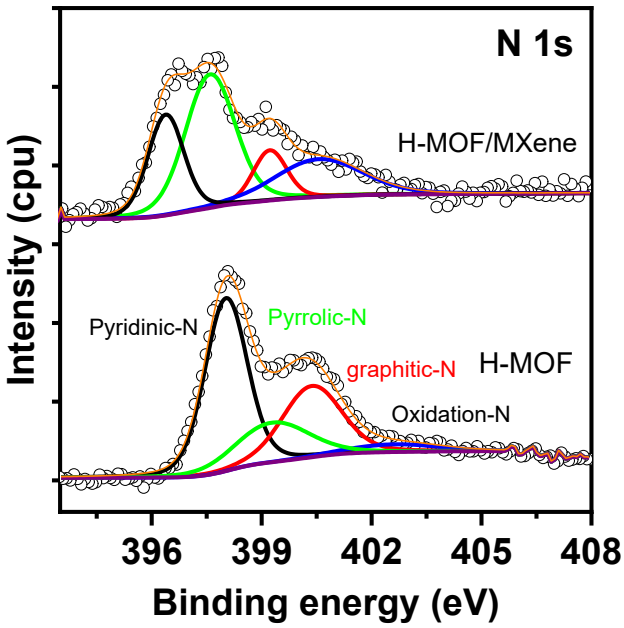

Fig. S10 N 1s XPS spectrum of H-MOF and H-MOF/MXene samples.

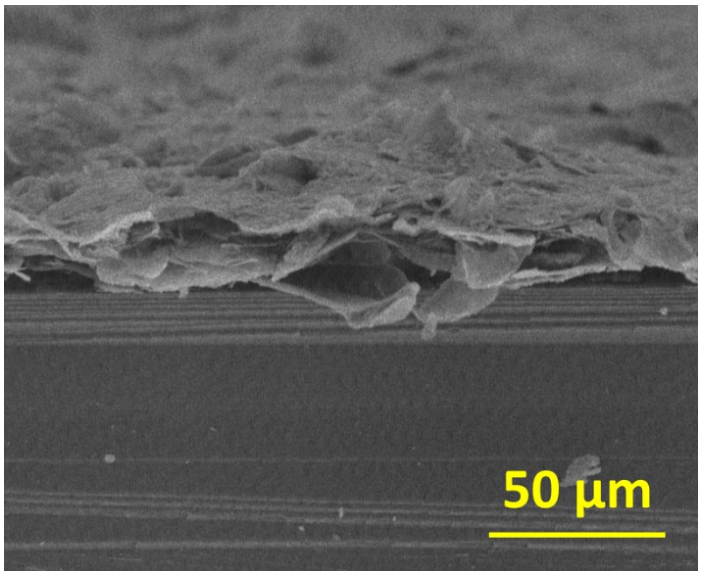

Fig. S11 Cross sectional SEM image of fabricated MXene-based sensor on the IDE electron coated on SiO_2 substrate.

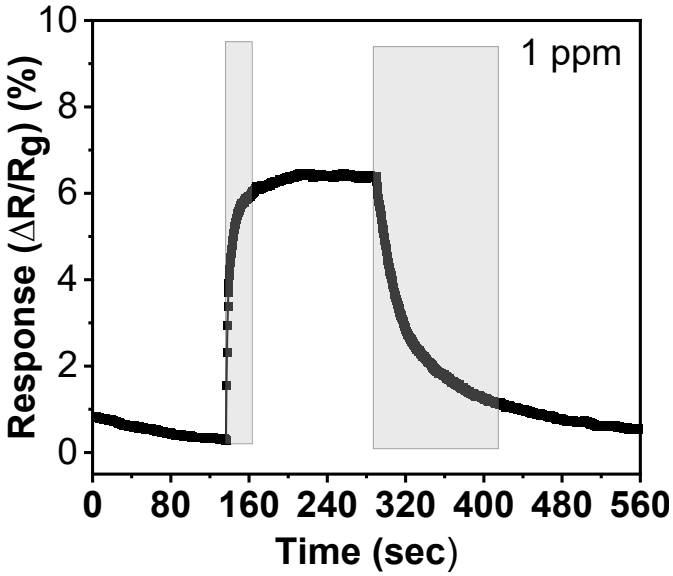

Fig. S12 Response and recovery graph of the H-MOF_6/MXene hybrid sample.

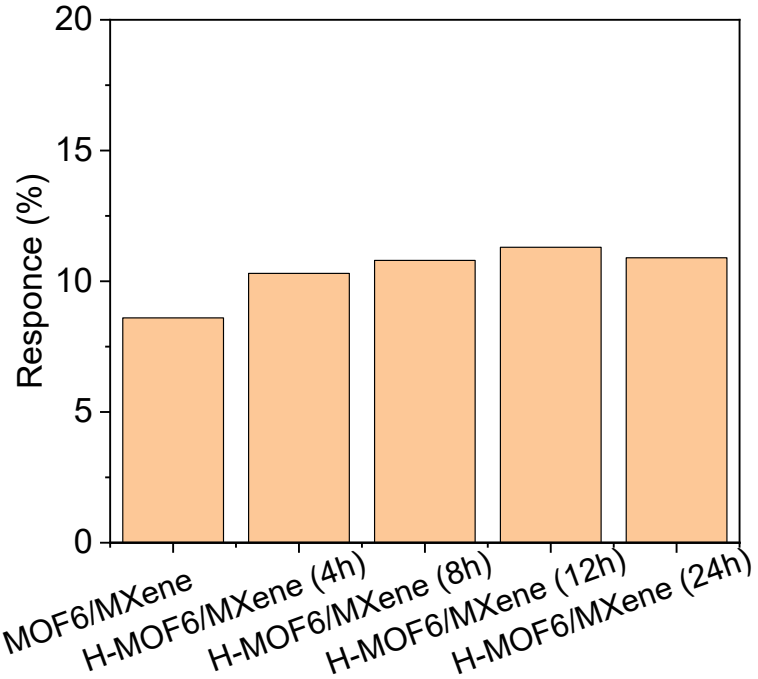

Fig. S13 Response graph of the H-MOF_6/MXene hybrid samples with the function of different immersion times of DMBIM over the MOF/MXene hybrid.

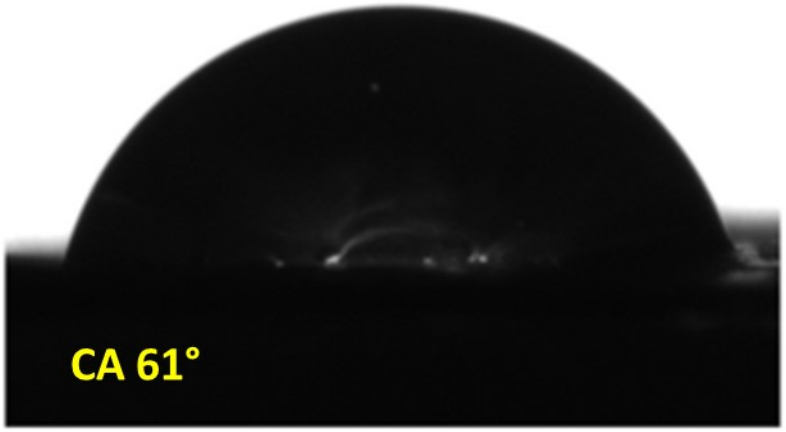

Fig. S14 Contact angle measurement of the pristine MXene sample.

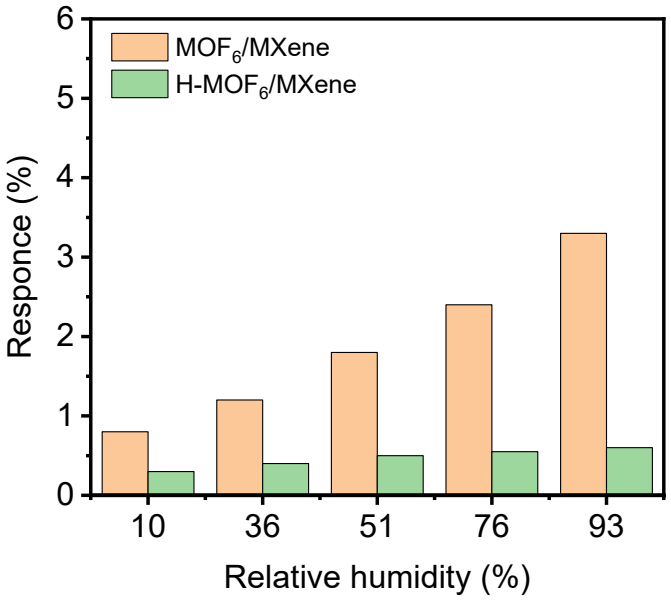

Fig. S15 Humidity response of the MOF_6/MXene and H-MOF_6/MXene sensors.

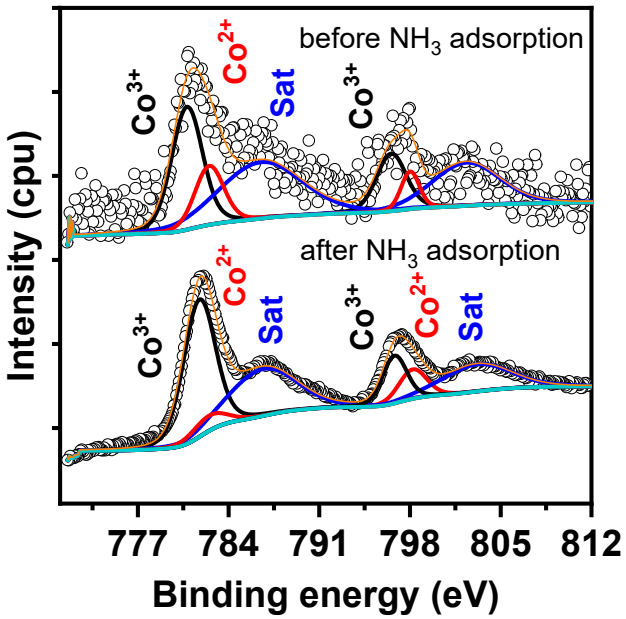

Fig. S16 Co 2p XPS spectra of the H-MOF$_6$/MXene hybrid before and after the NH_3 absorption.

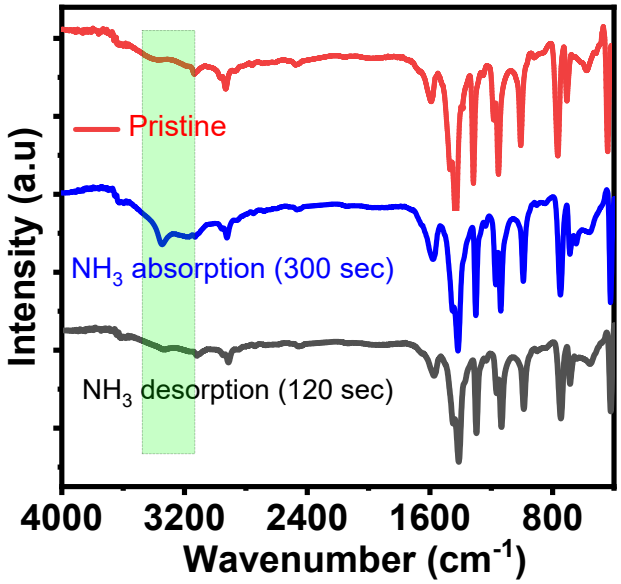

Fig. S17 FTIR spectra of the H-MOF/MXene sample with the function of NH# adsorption and desorption nature over time.

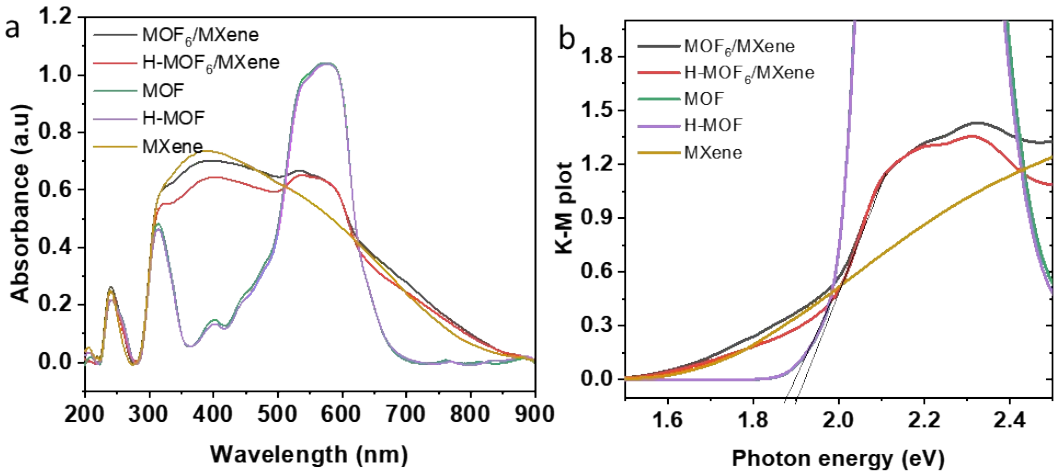

Fig. S18 (a) UV-DRS spectra and (b) K-M plot of the MXene-based hybrid samples.

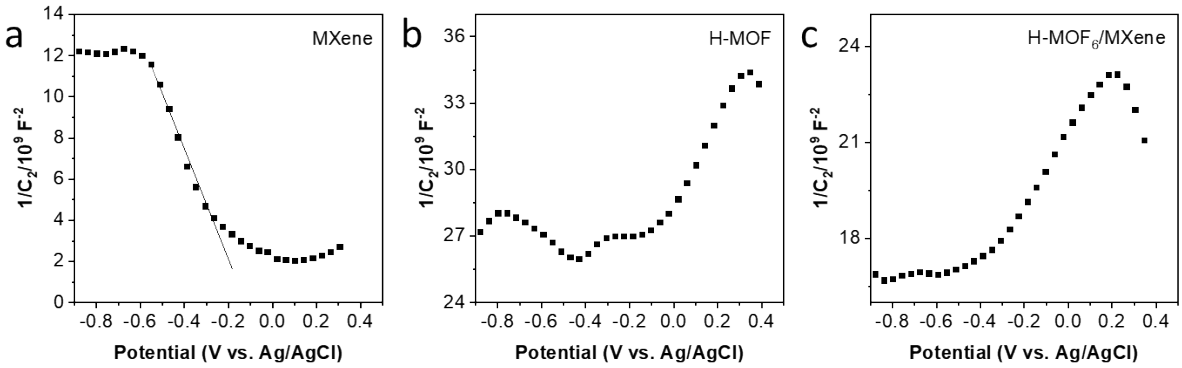

Fig. S19 Molt-Schottky plot for the (a) MXene, (b) H-MOF, and (c) H-MOF6/MXene-based nanostructures.

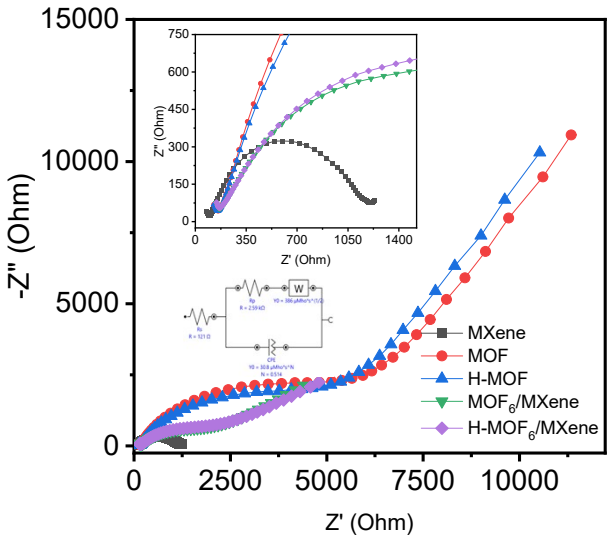

Fig. S20 EIS spectra of the MXene-based hybrid samples.