Supplementary Information (SI) for Materials Horizons.
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Supporting Information

Photocatalytic membranes based on Cu-NH_2-MIL-125(Ti) protected by poly(vinylidene fluoride) for high and stable hydrogen production

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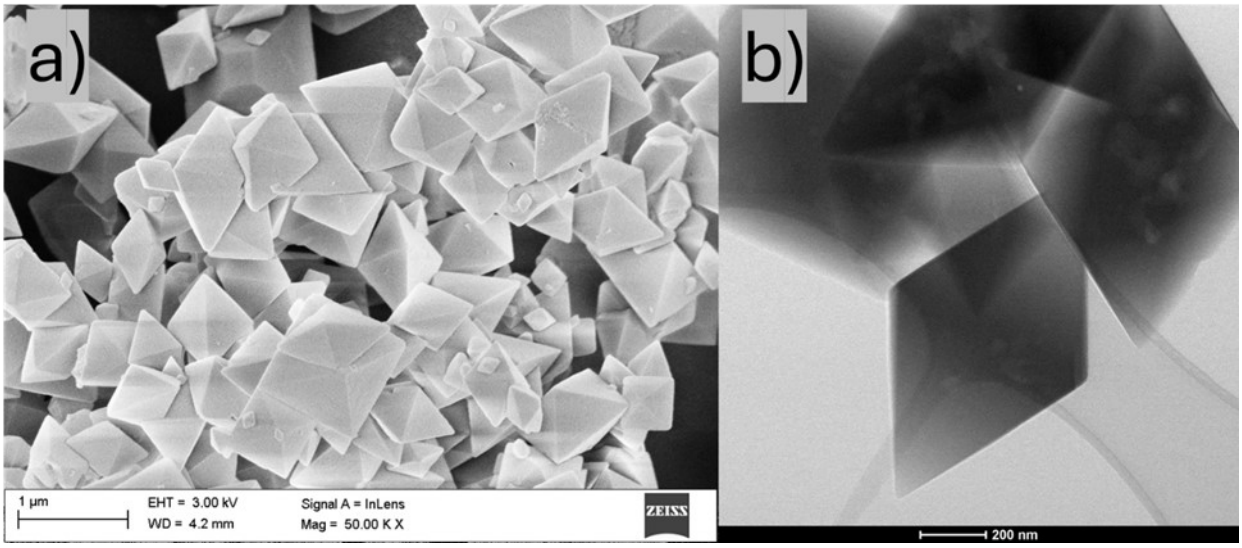

Fig. S1. The SEM (a) and TEM (b) image of MOF

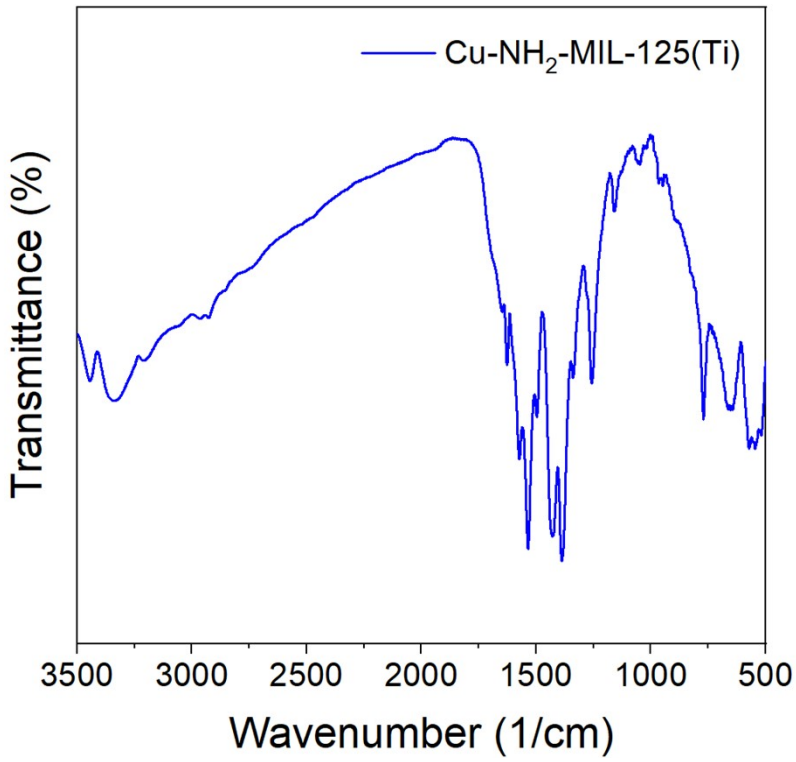

Fig. S2. FTIR patterns of Cu-NH_2-MIL-125(Ti).

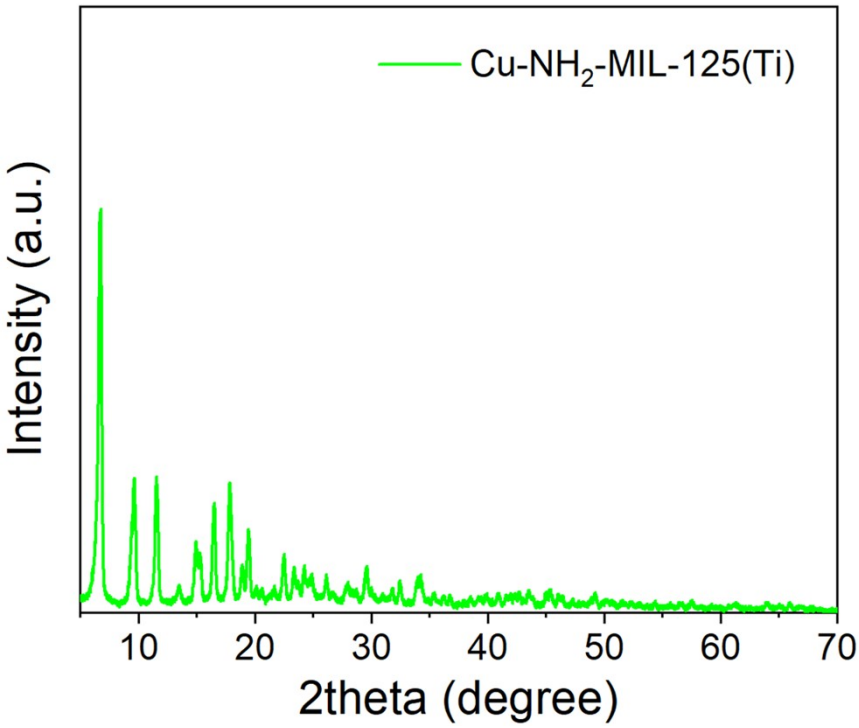

Fig. S3. XRD pattern of Cu-NH_2-MIL-125(Ti).

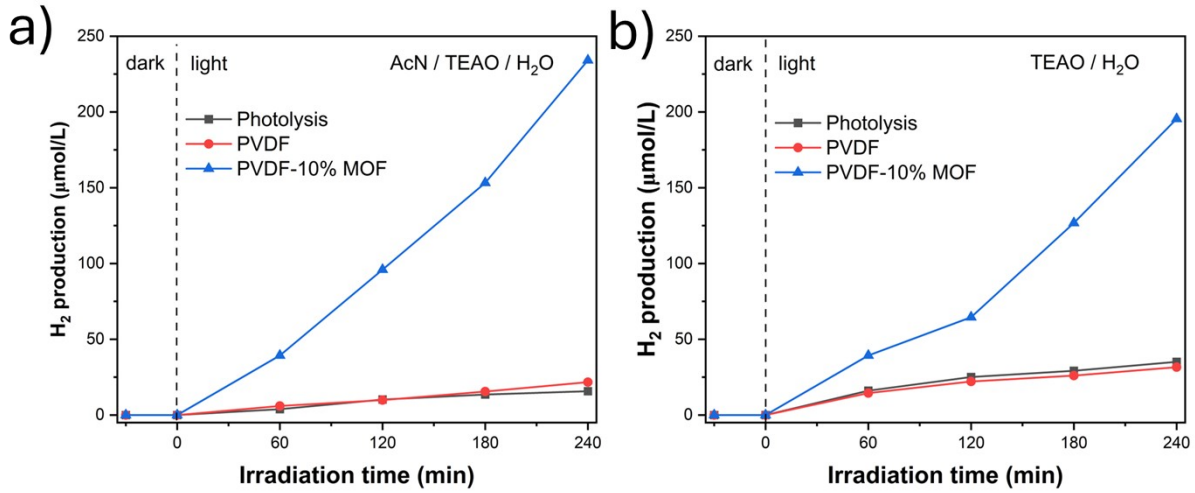

Fig. S4. Hydrogen production in two different electrolytes using membranes with and without MOF

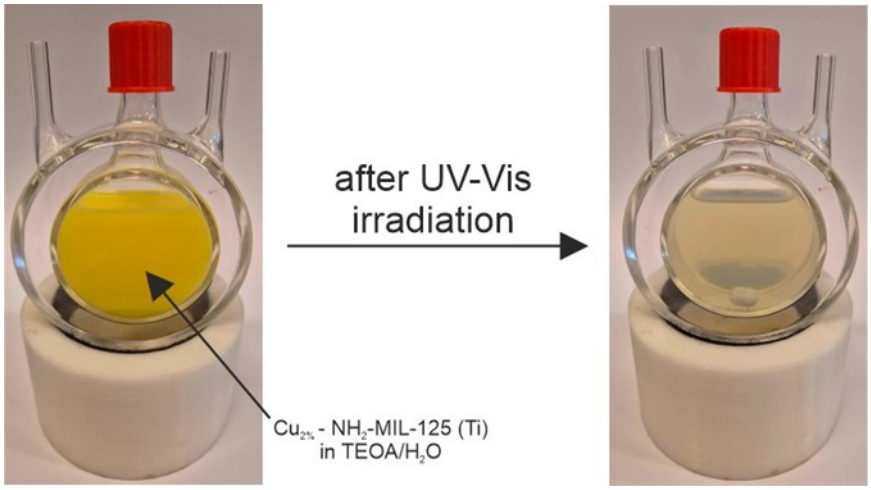

Fig. S5. Instability of powdered Cu-NH_2-MIL-125 MOF in electrolyte (A)

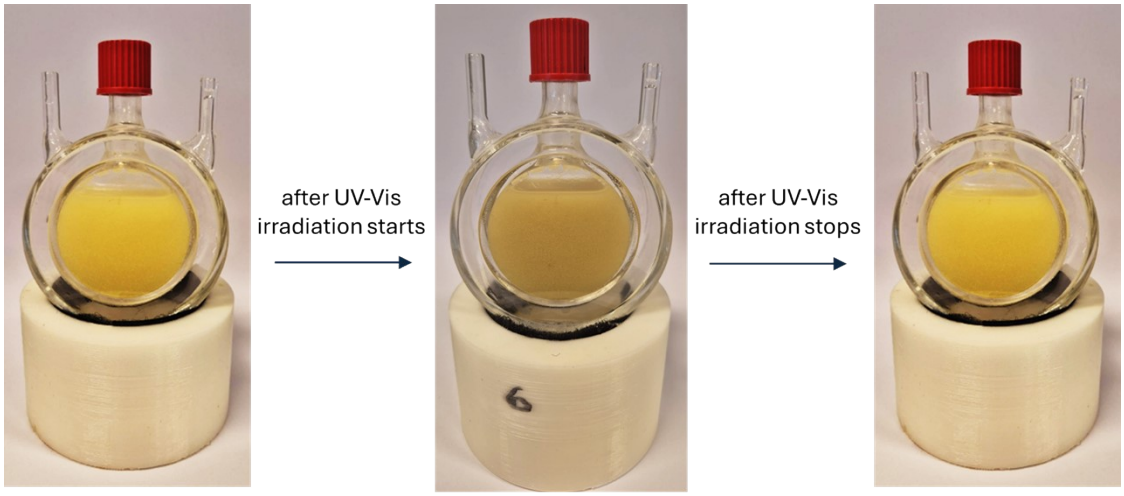

Fig. S6. Stability of powdered Cu-NH_2-MIL-125 MOF in electrolyte (B)

During the photoprocess, the change of MOF color can be observed due to the cyclic process of the oxidation and reduction of copper ions. Cu^{2+} is supposed to be reduced to Cu^{+} after trapping an electron and quickly return to Cu^{2+} due to the instability of Cu^{+}, releasing the electron again [1]. Importantly, after the irradiation stops, the MOF fully recovers its original color.

[1] D. Ao, J. Zhang, H. Liu, J. Photochem. Photobiol. A Chem., 2018, **364**, 524.

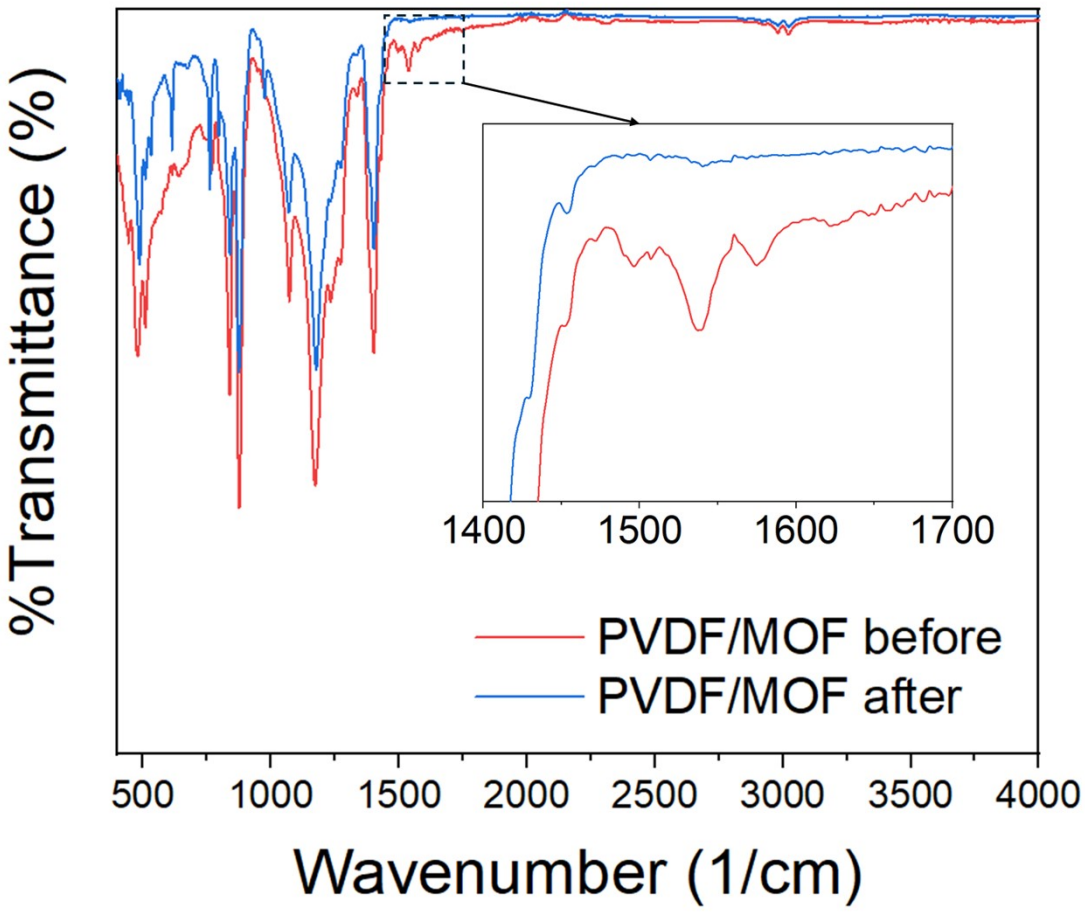

Fig. S7. FTIR spectra of PVDF/MOF membranes before and after the photo process