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Visible-Light photoreduction of CO₂ over a cobalt porphyrin-based metal-organic framework by sacrificial electron

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This study describes the CO₂ photoreduction over porphyrin-based metal-organic framework (Co/PMOF) in the presence of triethanolamine (TEOA) as a photocatalyst and sacrificial agent, respectively, under visible light irradiation. The photoluminescence properties of porphyrin and Co/PMOF showed that the lifetime of photogenerated charge carriers in Co/PMOF is longer than porphyrin. According to Fig. 1, Co/PMOF demonstrates significant photocatalytic activity toward CO₂ reduction. The HCOO⁻ was continuously produced, the amount increasing to 23.21 μmol in 6 h. No other products have been detected in gas and liquid phases, suggesting that the Co/PMOF has highly selective toward the CO₂ reduction. For comparison, TCCP was applied as a photocatalyst for CO₂ reduction under similar condition. Only 4.56 μmol of HCOO⁻ was produced after 6 h which is confirmed the photoactivity can be significantly increased by assembling the TCPP ligand onto MOFs structure.

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