Supporting Information

Doping Copper into ZIF-67 for Enhancing Gas Uptake Capacity and Visible-Light-Driven Photocatalytic Degradation of Organic

dye

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Experimental Section

General Procedures.

The synthesis was performed in 23 mL teflon-lined stainless steel container under autogenous pressure. Reagents were purchased commercially and used without further purification. Thermal analysis was carried out on a Netzsch STA449C thermal analyzer at a temperature range of 30 to 800 °C under nitrogen atmosphere with a heating rate of 10 °C·min⁻¹. X-ray powder diffraction experiments were performed in a Rigaku Dmax 2500 instrument with an ultra 18Kw Cu rotating anode point source. Gas adsorption measurement was performed in the ASAP (Accelerated Surface Area and Porosimetry) 2020 System. Electron paramagnetic resonance (EPR) signals were recorded with a Bruker ESP 300E electron paramagnetic resonance spectrometer.

ICP-AE	Co (%)	Cu (%)	ICP-AE	Co (%)	Cu (%)
1	23.90	3.26	6	23.85	1.28
2	25.16	0.13	7	24.28	1.63
3	22.31	1.00	8	24.56	2.35
4	25.04	0.115	9	25.10	0.466
5	22.87	5.04	10	22.33	1.85

Table S1: A Summary the content of Co and Cu in Cu/ZIF-67 (10 times).



Figure S1. The Powder XRD pattern of materials: (a) ZIF-67; (b) Cu/ZIF-67; (c) ZIF-67 after adsorption; (d) Cu/ZIF-67 after adsorption.



Figure S2. The Powder XRD pattern of ZIF-67 after photocatalytic experiment.



Figure S3. The Powder XRD pattern of **Cu/ZIF-67** after photocatalytic experiments: (a) 1st; (b) 2st; (c) 3st; (d) 4st; (e) 5st.



Figure S4. αhv^2 vs hv curves of materials: (a) ZIF-67; (b) Cu/ZIF-67.



Figure S5. The TGA diagrams of materials: (a) Cu/ZIF-67; (b) ZIF-67.



Figure S6. The concentrations of **Cu/ZIF-67** dispersed in MO-H₂O₂ solution during repeated photocatalytic experiments.



Figure S7. The EPR spectra of Cu/ZIF-67.



Figure S8. The measurement data of $MO-H_2O_2$ solution with **ZIF-67** (a) and **Cu/ZIF-67** (b) during adsorption equilibrium experiments in the dark for 60 min, respectively.



Figure S9. The degradation experiments data of $MO-H_2O_2$ solution with Cu/ZIF-67 without the visible-light illumination.



Figure S10. SEM images of the materials: (a) and (b) Crystals of **Cu/ZIF-67**; (c) Powder samples of **Cu/ZIF-67** before photocatalytic experiments; (d) Powder samples of **Cu/ZIF-67** after 5 times photocatalytic experiments.