

## Supplementary Information

### **Synergistic Effect of ZnO-ZnFe<sub>2</sub>O<sub>4</sub> Heterostructure for Enhanced Surface Catalytic Activity in Cr (VI) Reduction, Green H<sub>2</sub> Generation and CO Sensing: Experimental Study supported by DFT**

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**Fig. S 1.** Schematic of synthesis procedure of ZnO-ZFO heterostructure.

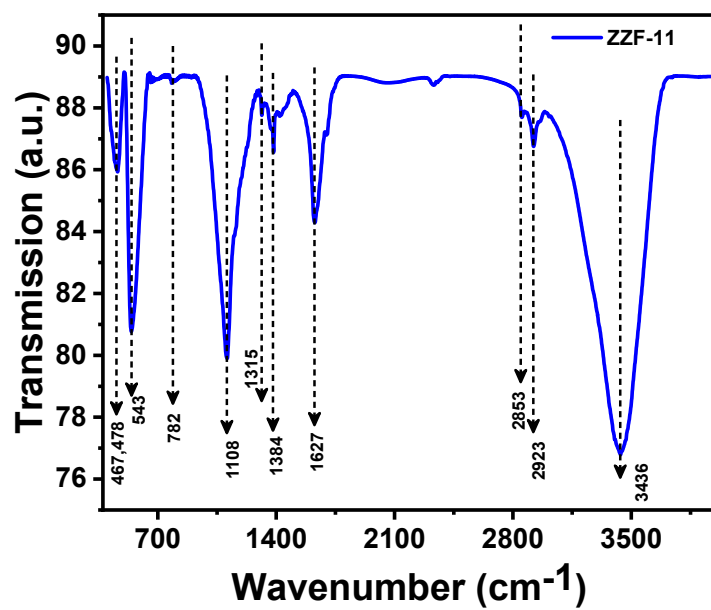
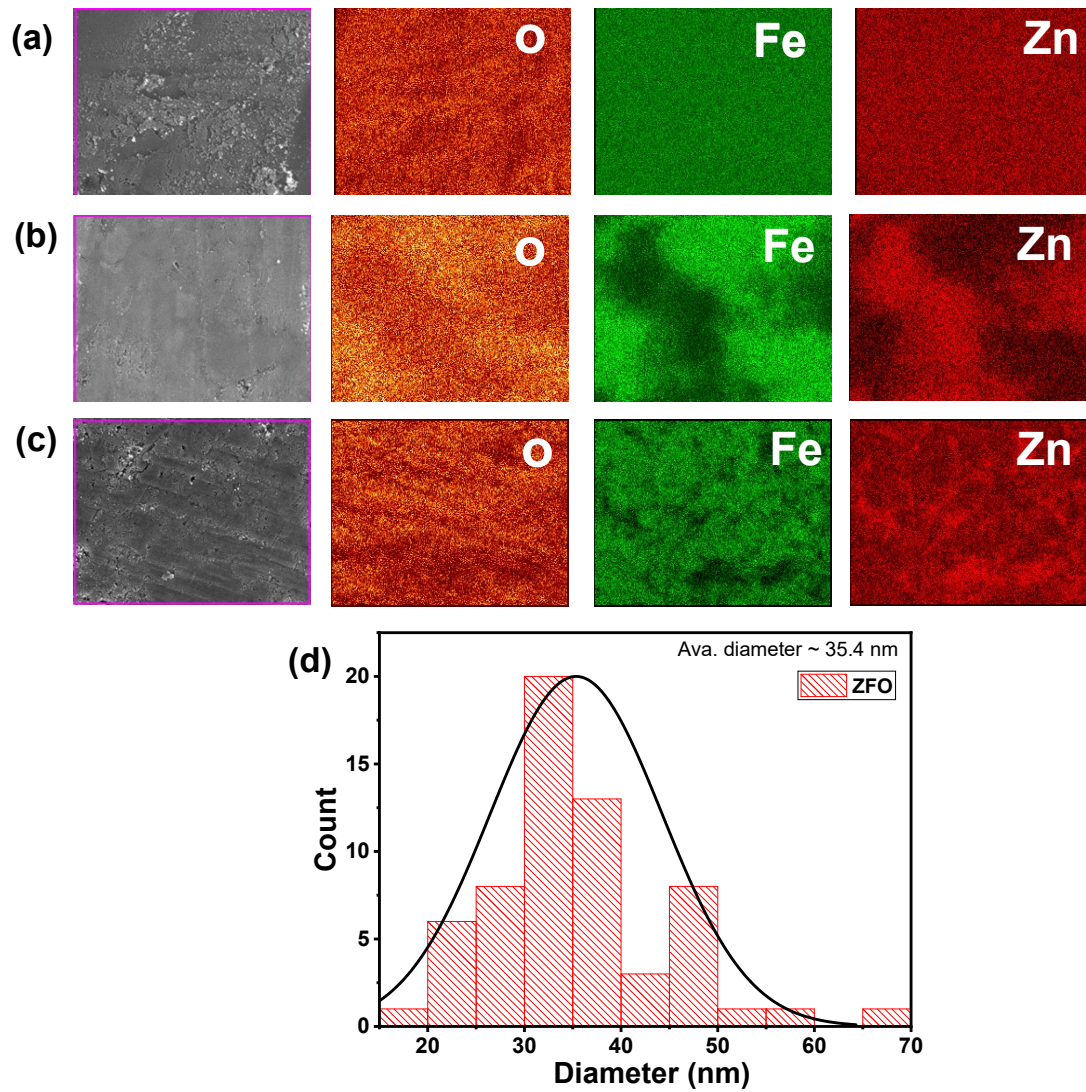


Fig. S 2. FTIR spectra of ZZF-11 sample.



**Fig. S 3.** Elemental mapping of (a) ZFO (b) ZZF-31 (c) ZZF-13 (d) Histogram of Particle size distribution of ZFO corresponding to Fig.4(g)

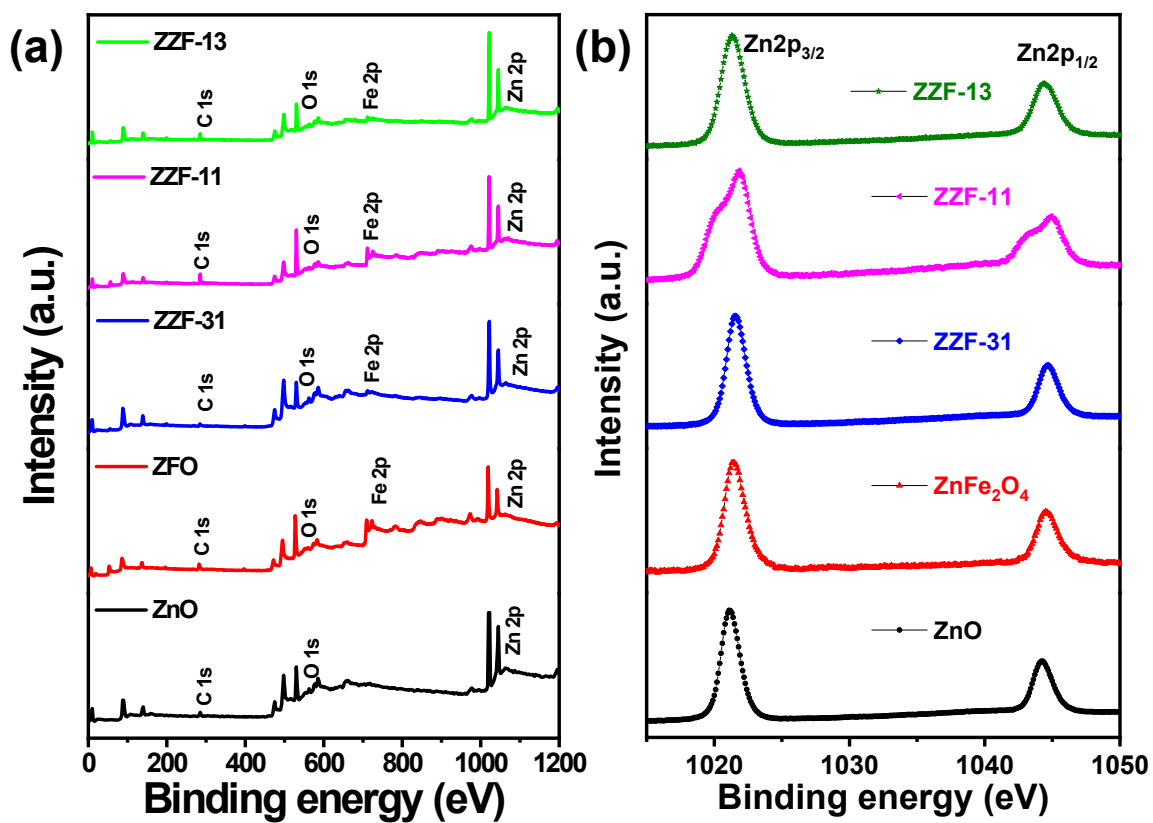
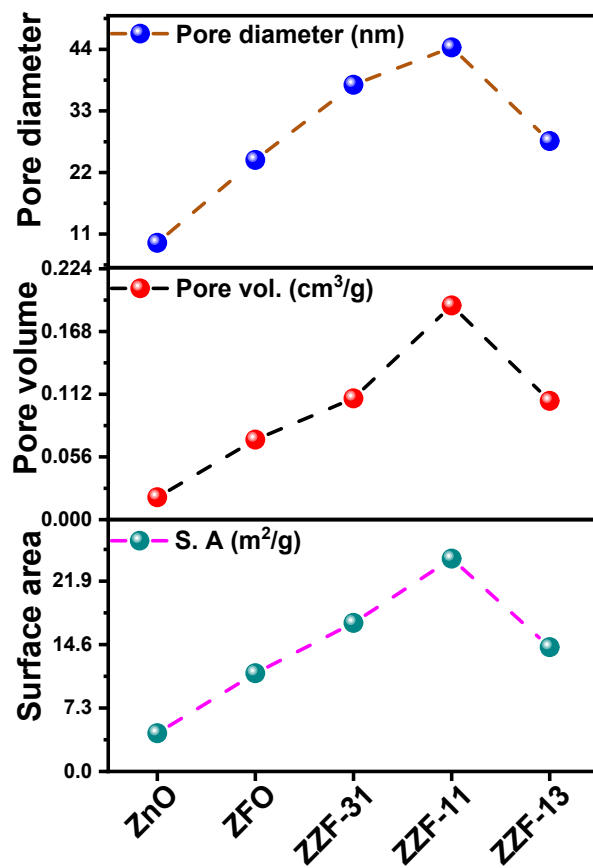
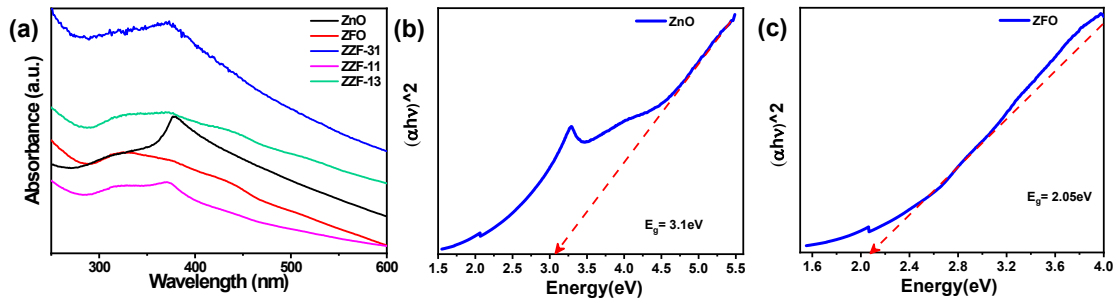


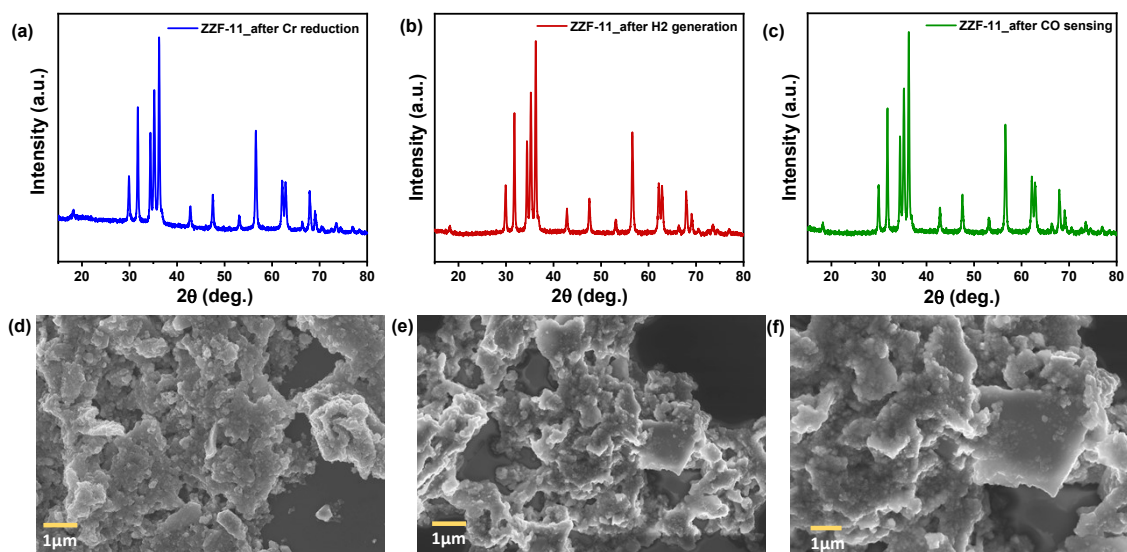
Fig. S 4. (a) XPS survey scan of ZnO, ZFO, ZZF-11, ZZF-13, ZZF-31. (b) HR-XPS spectra of Zn 2p region of all the samples.



**Fig. S 5.** Variation of surface area, pore volume and pore diameter of in ZnO, ZFO, ZZF-31, ZZF-11, ZZF-13 samples.



**Fig. S 6.** (a) UV-Vis adsorption spectra of all the samples. Tauc plot of (b) ZnO, (c) ZFO.



**Fig. S 7.** XRD pattern and FESEM morphology of the ZZF-11 sample after (a,d) complete degradation of Cr(VI), (b,e) photocatalytic H<sub>2</sub> generation, (c,f) repetitive CO sensing test respectively.

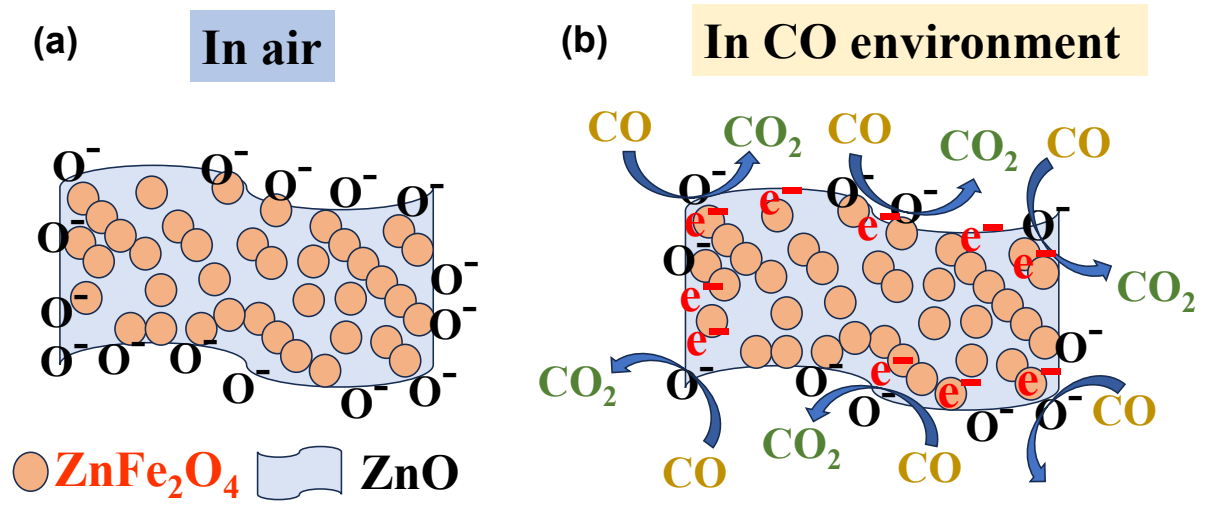
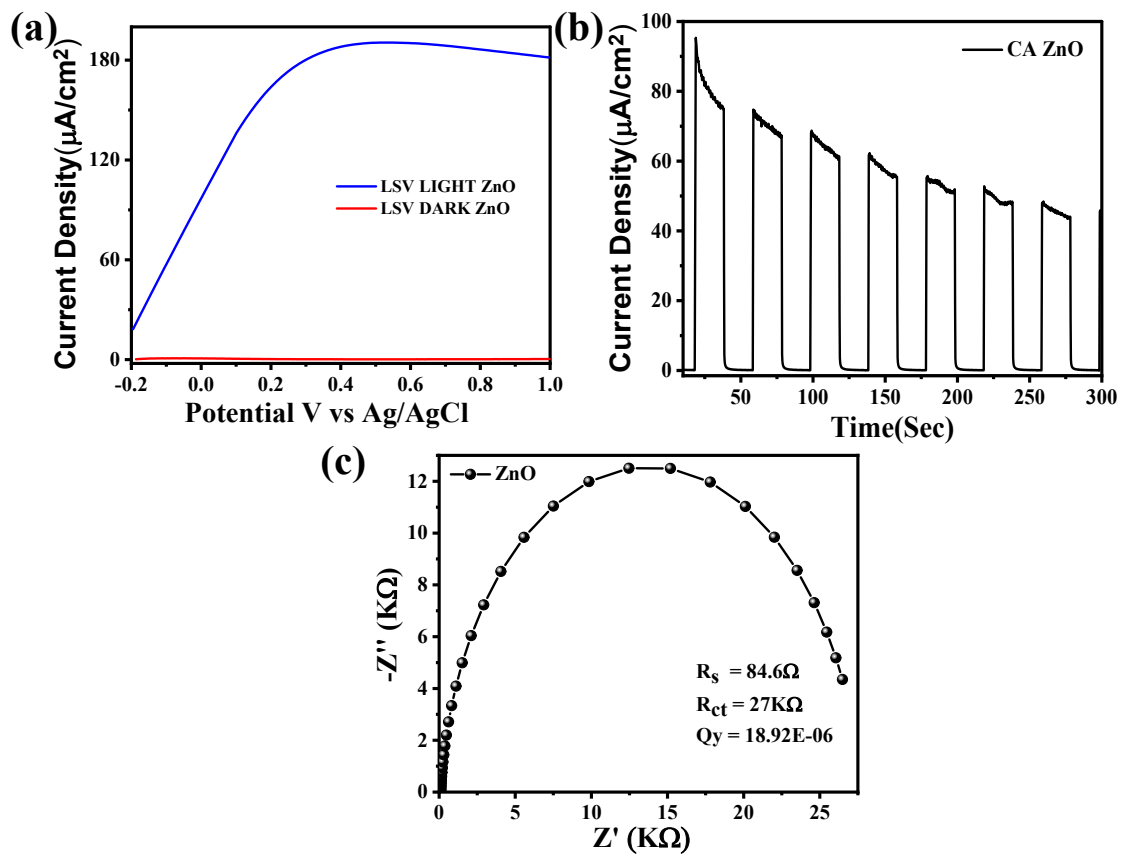


Fig. S 8. Schematic of the CO sensing mechanism of ZZF-11.





**Fig. S 9.** (a) LSV curve of ZnO at light on/off state. (b) Transient photocurrent spectra of ZnO. (c) Electrochemical impedance spectra of ZnO and (d) M-S plot of ZnO.

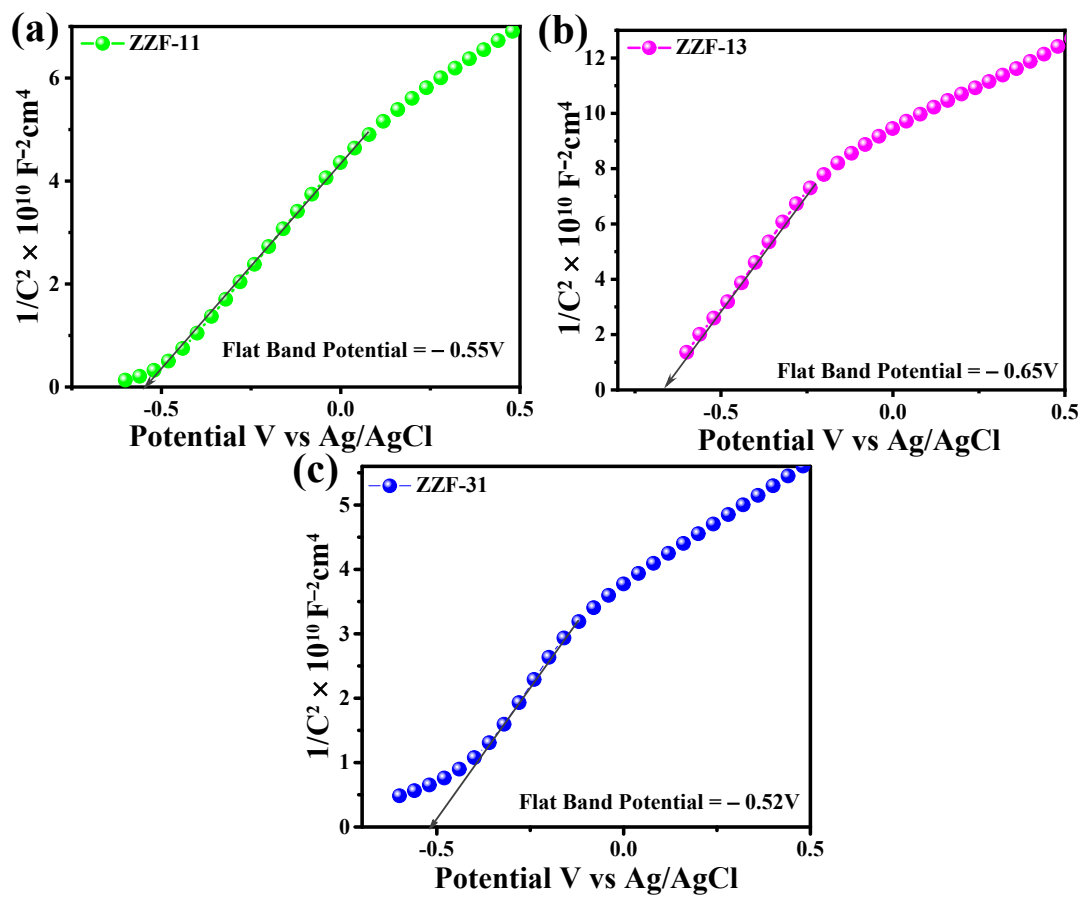


Fig. S 10. M-S plot of (a) ZZF-11, (b) ZZF-13 and (c) ZZF-31