

## Supporting Information

### **Insights into the development and proceeding of $\text{CuO/CuFe}_2\text{S}_x\text{O}_{4-x}$ catalysts: An effective approach for hydrogen generation**

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**Table S1:** Chemical composition and atomic percentages of  $\text{CuFe}_2\text{O}_4$  determined using energy-dispersive X-ray (EDX) analysis.

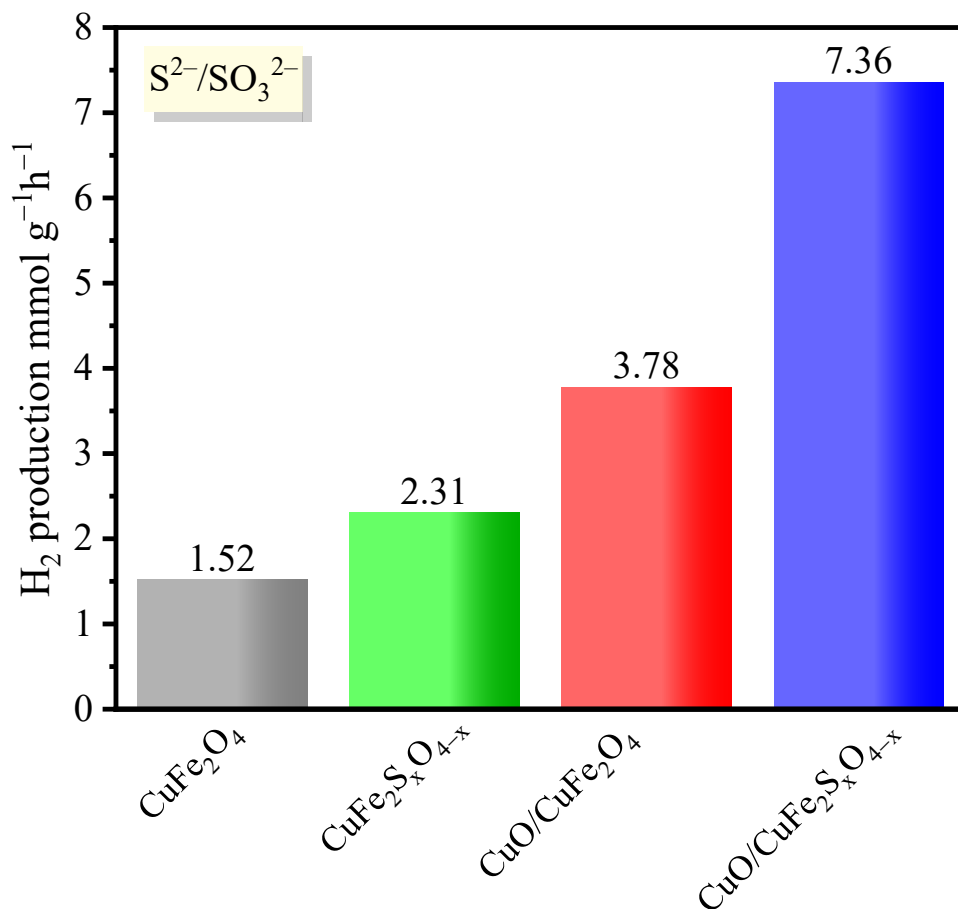
<b>Elements</b>	<b>Weight %</b>	<b>At %</b>
C	0.66	1.68
O	25.28	54.75
Fe	47.92	28.56
Cu	26.14	15.01
Totals	100	100

**Table S2:** Energy-Dispersive X-ray (EDX) analysis was used to estimate the elemental weight and atomic percentages in the as-prepared  $\text{CuO}/\text{CuFe}_2\text{S}_x\text{O}_{4-x}$ .

<b>Elements</b>	<b>Weight %</b>	<b>At %</b>
C	0.61	1.66
O	25.88	56.74
S	2.2	1.24
Fe	47.95	29.12
Cu	23.36	11.24
Totals	100	100

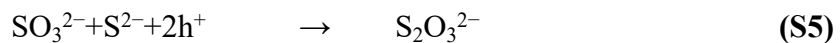
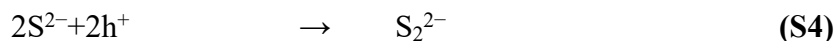
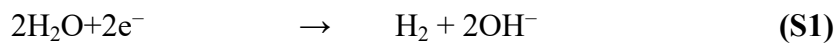
**Table S3:** Magnetic parameters Magnetic saturation, Residual magnetic intensity, Coercivity and Squareness ratio of as-synthesized catalysts.

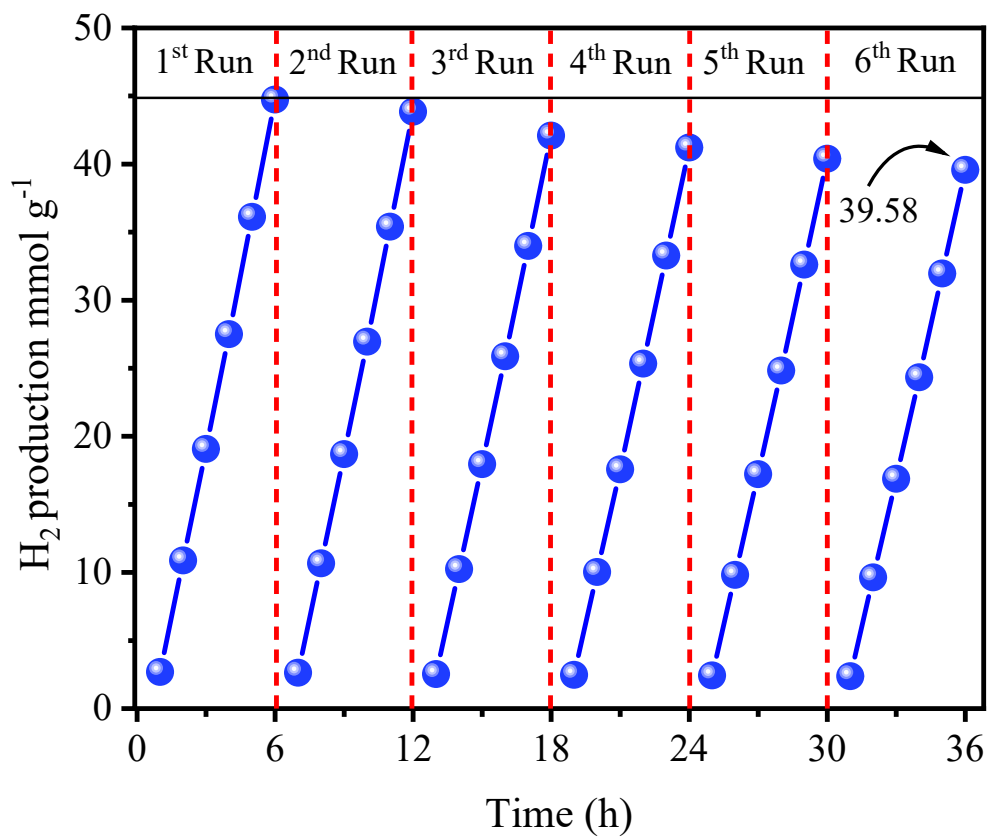
<b>Magnetic Parameters</b>	<b>CuFe<sub>2</sub>O<sub>4</sub></b>	<b>CuO/CuFe<sub>2</sub>O<sub>4</sub></b>	<b>CuO/CuFe<sub>2</sub>S<sub>x</sub>O<sub>4-x</sub></b>
Magnetic saturation (MS) (emu/g)	21.4	40.7	31.6
Residual magnetic intensity (Mr) (emu/g)	4.5	10.1	7.04
Coercivity (Hc) (G)	218	346	294
Squareness ratio	0.021	0.029	0.023



**Figure S1:** Photocatalytic H<sub>2</sub> evolution of CuFe<sub>2</sub>O<sub>4</sub>, CuFe<sub>2</sub>S<sub>x</sub>O<sub>4-x</sub>, CuO/CuFe<sub>2</sub>O<sub>4</sub> and CuO/CuFe<sub>2</sub>S<sub>x</sub>O<sub>4-x</sub> photocatalysts in the presence of S<sup>2-</sup>/SO<sub>3</sub><sup>2-</sup> sacrificial reagents.

The suggested reaction mechanism for the photocatalytic H<sub>2</sub> evolution in the presence of S<sup>2-</sup>/SO<sub>3</sub><sup>2-</sup> mixtures is given in equation S1-S6<sup>1</sup>,





**Figure S2:** Recyclability test of catalysts.

## References:

1. J. Schneider and D. W. Bahnemann, *The Journal of Physical Chemistry Letters*, 2013, **4**, 3479-3483.