

## Supplementary Materials:

# Effect of the preparation method on Cu-MOR/g-C<sub>3</sub>N<sub>4</sub> for direct methanol synthesis from methane oxidation by photothermal catalysis

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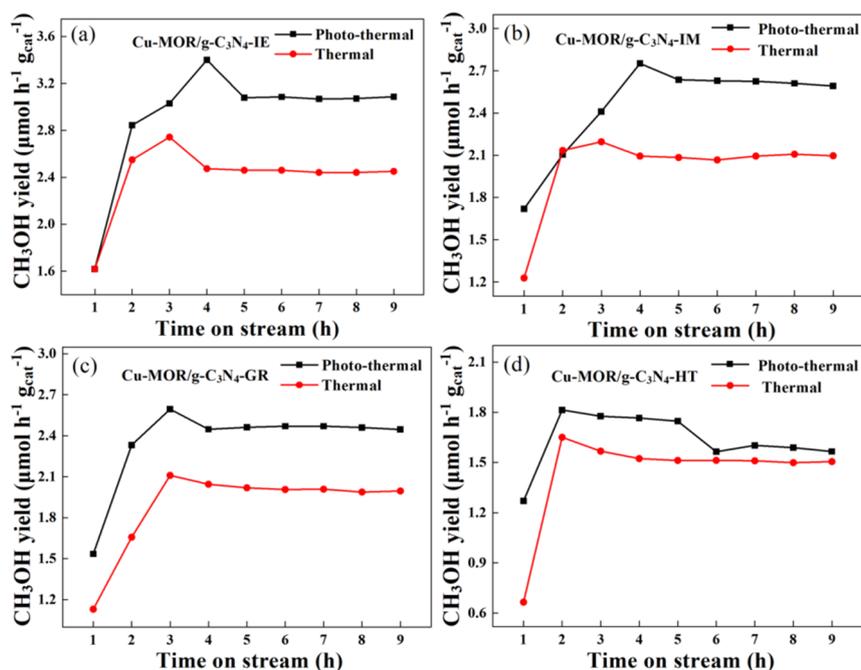


Figure S1. Methanol yield of Cu-MOR/g-C<sub>3</sub>N<sub>4</sub> prepared by different methods by photothermal catalysis and thermal catalysis.

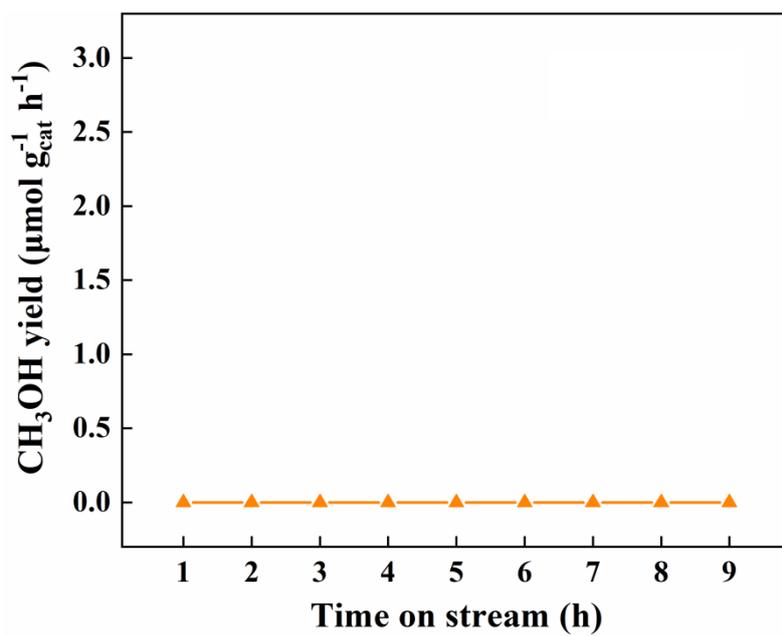


Figure S2. CH<sub>3</sub>OH yield on Cu-MOR/g-C<sub>3</sub>N<sub>4</sub>-IE by photo catalysis.

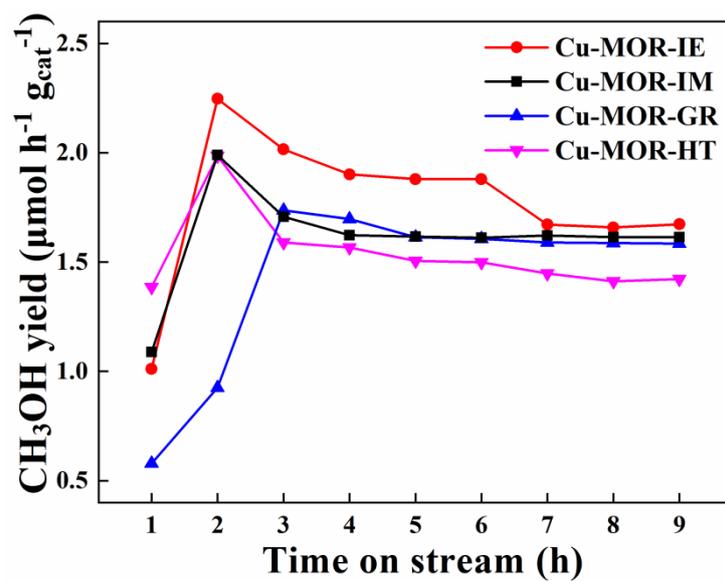


Figure S3. Methanol yield of Cu-MOR prepared by different methods by thermal catalysis.

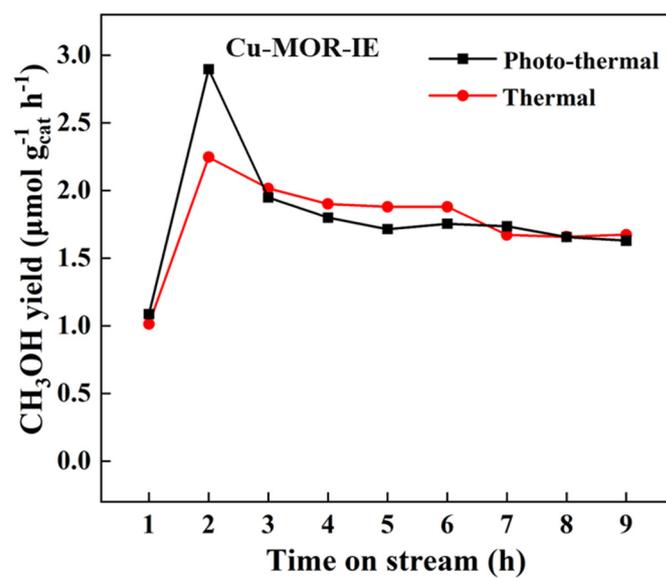
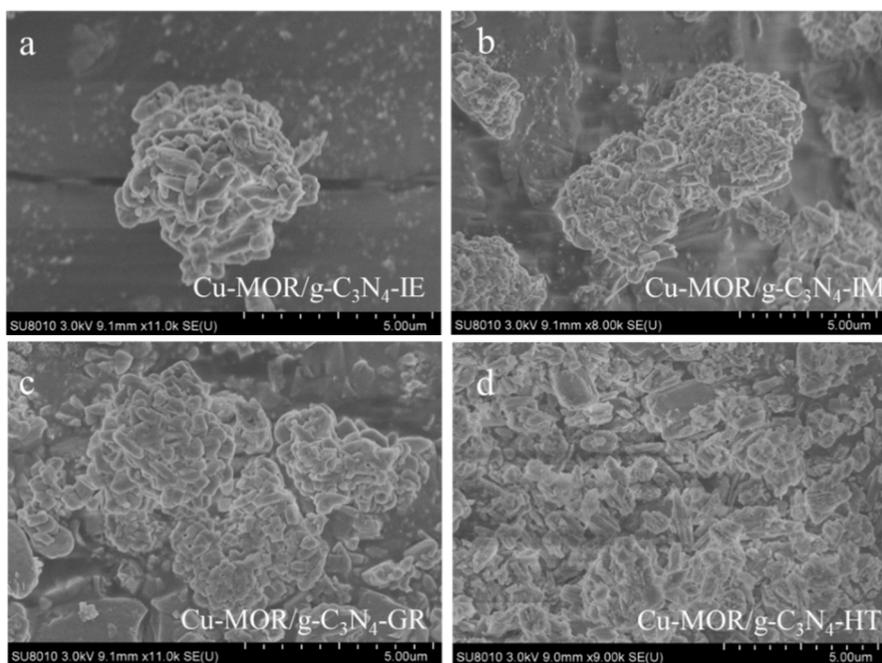


Figure S4. Methanol yield of Cu-MOR-IE by photothermal catalysis and thermal catalysis.



**Figure S5.** SEM of Cu-MOR/g-C<sub>3</sub>N<sub>4</sub> with different preparation methods.

**Table S1.** Fitted EIS results of Cu-MOR/g-C<sub>3</sub>N<sub>4</sub> with different preparation methods based on the equivalent circuit.

Catalyst	$R_{ct} (\times 10^5 \Omega)$	$R_s (\Omega)$	CPE ( $F \cdot cm^{-2}$ )
Cu-MOR/g-C <sub>3</sub> N <sub>4</sub> -IE	0.41	69.17	0.89
Cu-MOR/g-C <sub>3</sub> N <sub>4</sub> -IM	0.93	1.72	0.92
Cu-MOR/g-C <sub>3</sub> N <sub>4</sub> -GR	2.06	115.80	0.87
Cu-MOR/g-C <sub>3</sub> N <sub>4</sub> -HT	4.47	113.40	0.85