

Supplementary information

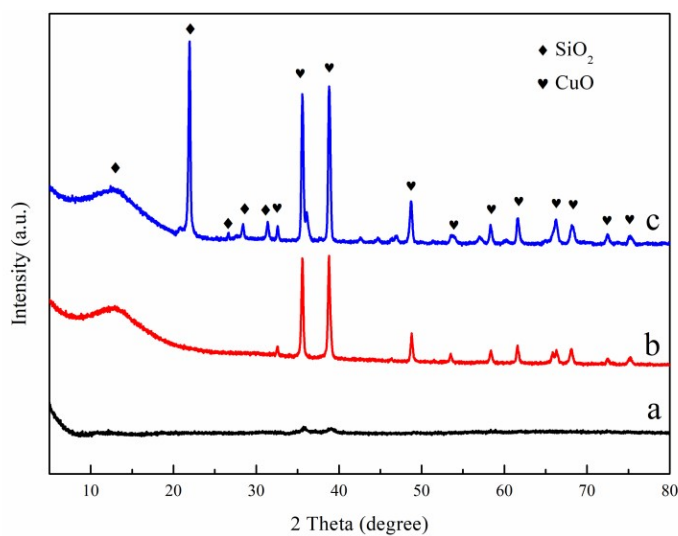


Fig. 1s XRD patterns of a: 30CuO/SiO<sub>2</sub>; b: 30CuO/SiO<sub>2</sub>-650; c: 30CuO/SiO<sub>2</sub>-850;

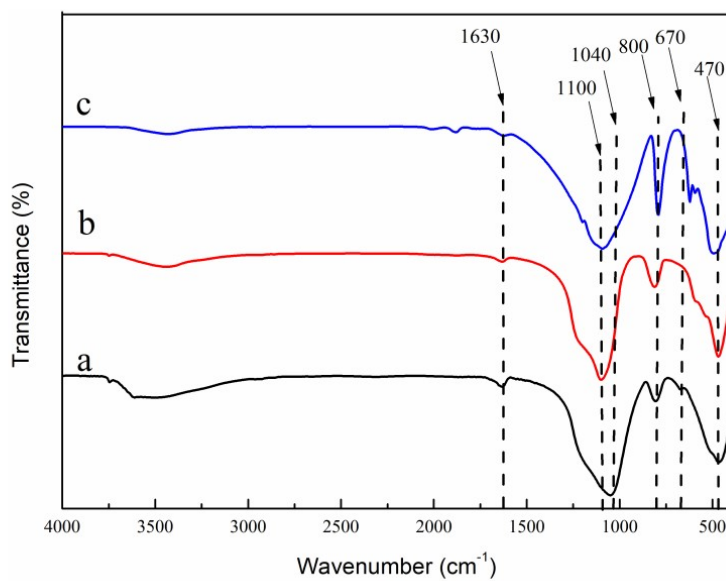


Fig. 2s FT-IR results a: 30CuO/SiO<sub>2</sub>; b: 30CuO/SiO<sub>2</sub>-650; c: 30CuO/SiO<sub>2</sub>-850;

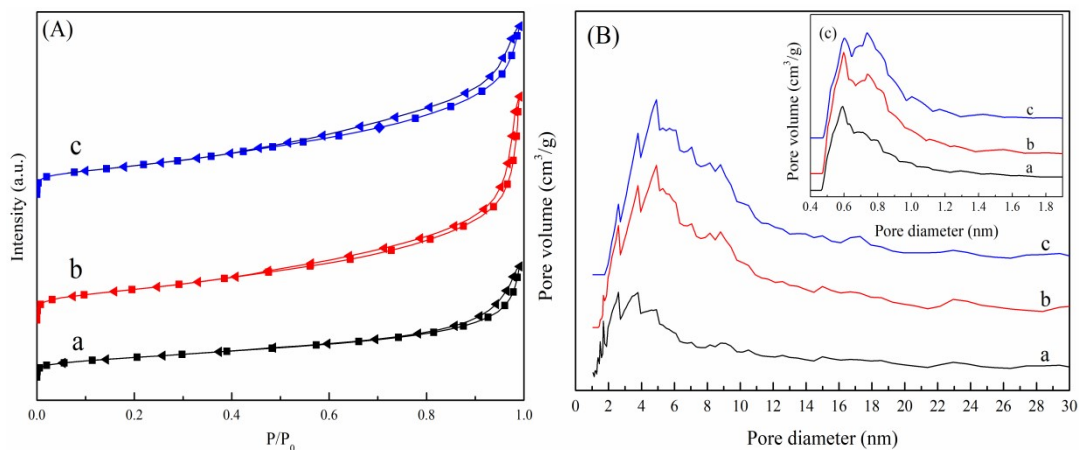


Fig. 3s N<sub>2</sub> adsorption-desorption results (A) adsorption isotherm curves (B) mesopore size distribution curves (C) micropore size distribution curves a: 20CuO/SiO<sub>2</sub>; b: 30CuO/SiO<sub>2</sub>; c: 40CuO/SiO<sub>2</sub>.

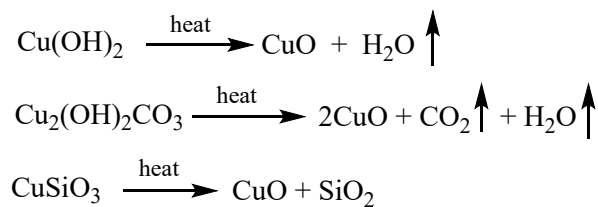


Fig. 4s The thermal decomposition equation of 30CuO/SiO<sub>2</sub> precursor

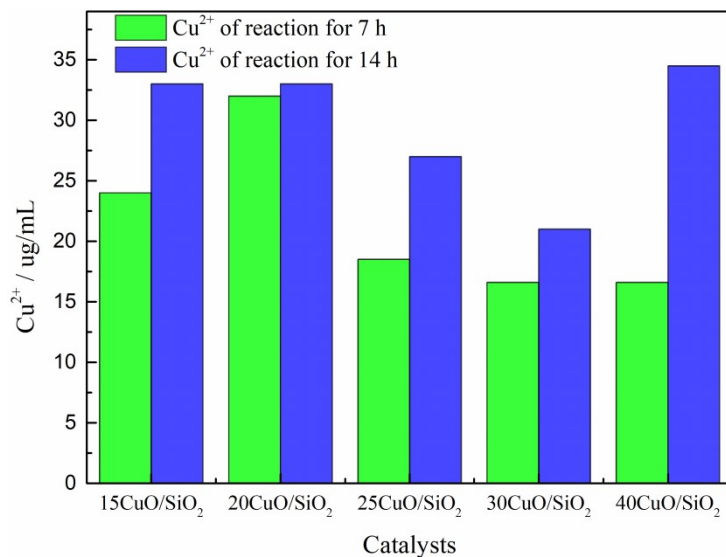


Fig. 5s Cu<sup>2+</sup> loss of xCuO/SiO<sub>2</sub> in ethynylation reaction of formaldehyde

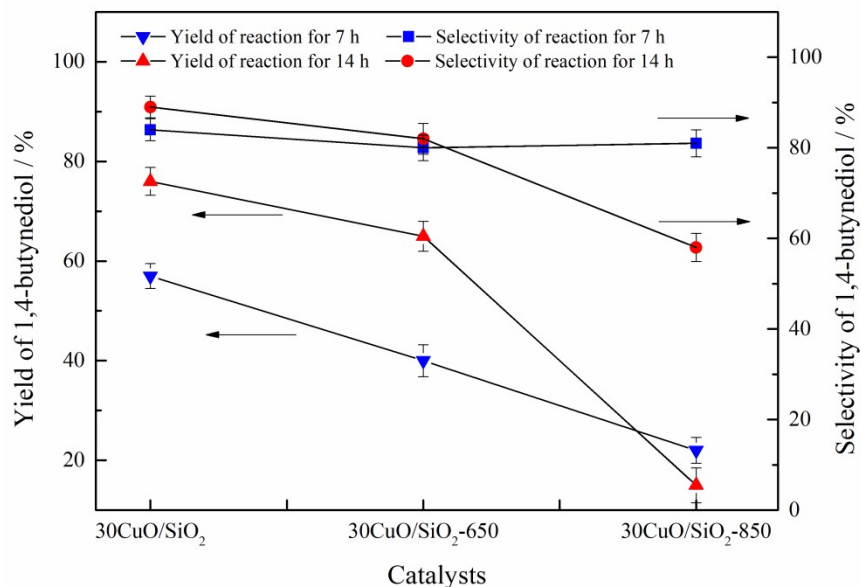


Fig. 6s The performances of 30CuO/SiO<sub>2</sub> in ethynylation reaction of formaldehyde

Table 1s The exact amount of catalysts preparation procedure and Cu weight

Catalysts	Cu(NO <sub>3</sub> ) <sub>2</sub> ·3H <sub>2</sub> O (g)	H <sub>2</sub> O (mL)	TEOS (mL)	EtOH (mL)	Cu wt % In theory	Cu wt %*
15Cu/SiO <sub>2</sub>	3.398	141	18.10	20	15.00%	12.08%
20Cu/SiO <sub>2</sub>	4.530	188	16.80	20	20.00%	17.79%
25Cu/SiO <sub>2</sub>	5.663	234	15.10	20	25.00%	22.21%
30Cu/SiO <sub>2</sub>	6.795	281	14.00	20	30.00%	27.32%
40Cu/SiO <sub>2</sub>	9.060	375	11.20	20	40.00%	38.08%

\*Cu weight content (Cu w t %) in catalysts obtained from atomic absorption spectroscopy.

Table 2s Textural properties of catalysts

Catalyst	A <sub>BET</sub> (m <sup>2</sup> ·g <sup>-1</sup> )	D <sub>micropore</sub> (nm)	D <sub>mesopore</sub> (nm)	V <sub>total</sub> (cm <sup>3</sup> ·g <sup>-1</sup> )
20CuO/SiO <sub>2</sub>	320.02	0.593	3.54	0.75
30CuO/SiO <sub>2</sub>	498.57	0.598	4.90	1.51
40CuO/SiO <sub>2</sub>	479.31	0.737	4.90	1.14