Supporting information

Importance of Zinc Oxide in Cu-Based Catalysts for the Ethynylation of Formaldehyde to 1,4-Butynediol

Lijun Ban[a,b] *, Haitao Li*[*a], *Yin Zhang*[a], *Ruifang Wu*[a], *Xin Huang*[a,b], *Jianghong Zhao*[*a], *Yongxiang Zhao*[*a]

[a] Engineering Research Center of Ministry of Education for Fine Chemicals, Shanxi University, China

[b] School of Chemistry and Chemical Engineering, Shanxi University, Taiyuan 030006, China

*Corresponding Authors: htli@sxu.edu.cn (Haitao Li), zhaojianghong@sxu.edu.cn(Jianghong Zhao), yxzhao@sxu.edu.cn (Yongxiang Zhao).

Table S1. Textural Properties of the Cu-Based Catalysts

	S_{BET} ($m^2 \cdot g^{-1}$)	D_{pore} (nm)	V_{pore} ($cm^3 \cdot g^{-1}$)
CuO	8.02	9.02	0.023
CuO-0.2ZnO	9.47	11.82	0.028
CuO-0.33ZnO	12.92	10.9	0.033
CuO-1ZnO	52.61	19.82	0.26

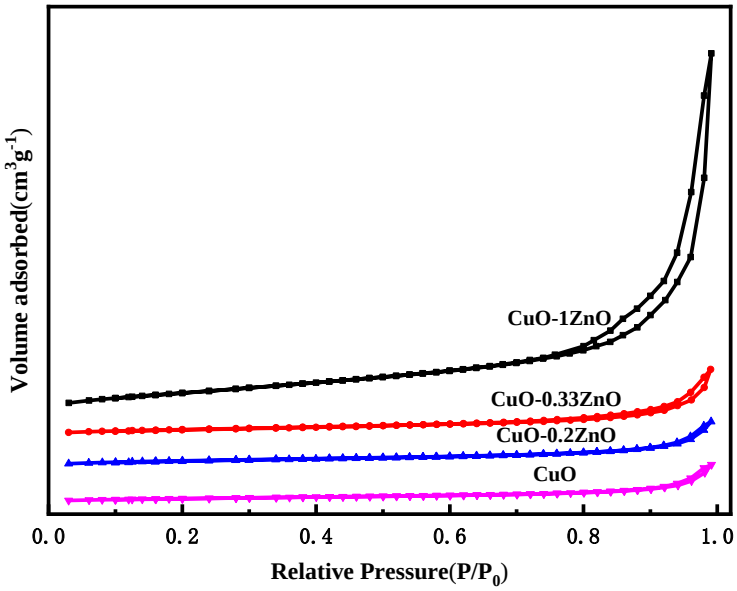

Figure S1. N_2 adsorption-desorption isotherms

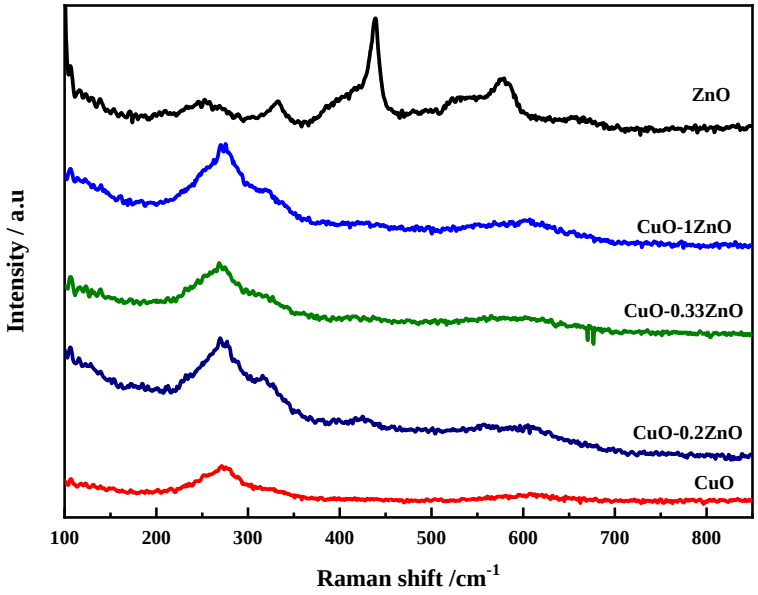

Figure S2. Raman spectra of the CuO and CuO-xZnO catalysts.

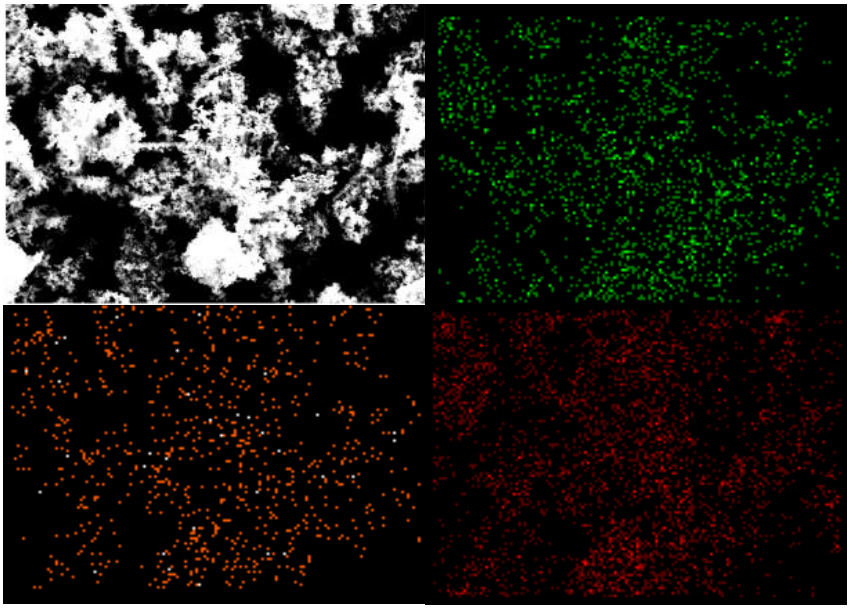

Figure S3. Elemental mappings of Cu, Zn, and O of the CuO-0.33ZnO catalyst.

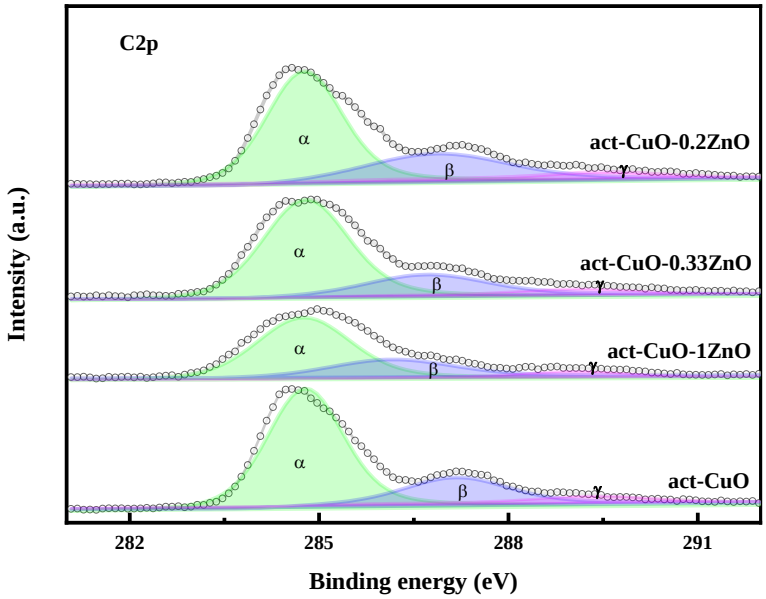

Figure S4. C 1s high-resolution XPS spectra of the CuO and CuO-xZnO catalysts.

Table S2 Structural and textural properties of catalysts

Samples	$Cu_{2p3/2}$ (eV)	$Cu_{2p1/2}$ (eV)	$Zn_{2p1/2}$ (eV)	$Zn_{2p3/2}$ (eV)	Zn/Cu (molar ratio) (activation catalyst)
CuO	933.9	953.9	-	-	-
CuO-0.2ZnO	932.8	952.8	1022.5	1045.6	0.17
CuO-0.33ZnO	932.8	952.8	1022.5	1045.6	0.32
CuO-1ZnO	933.2	953.2	1022.1	1045.2	1.72
ZnO	-	-	1021.4	1044.5	-