

## Electronic Supplementary Information

### **Effect of calcination temperature on the Cu-ZrO<sub>2</sub> interfacial structure and its catalytic behavior in the hydrogenation of dimethyl oxalate**

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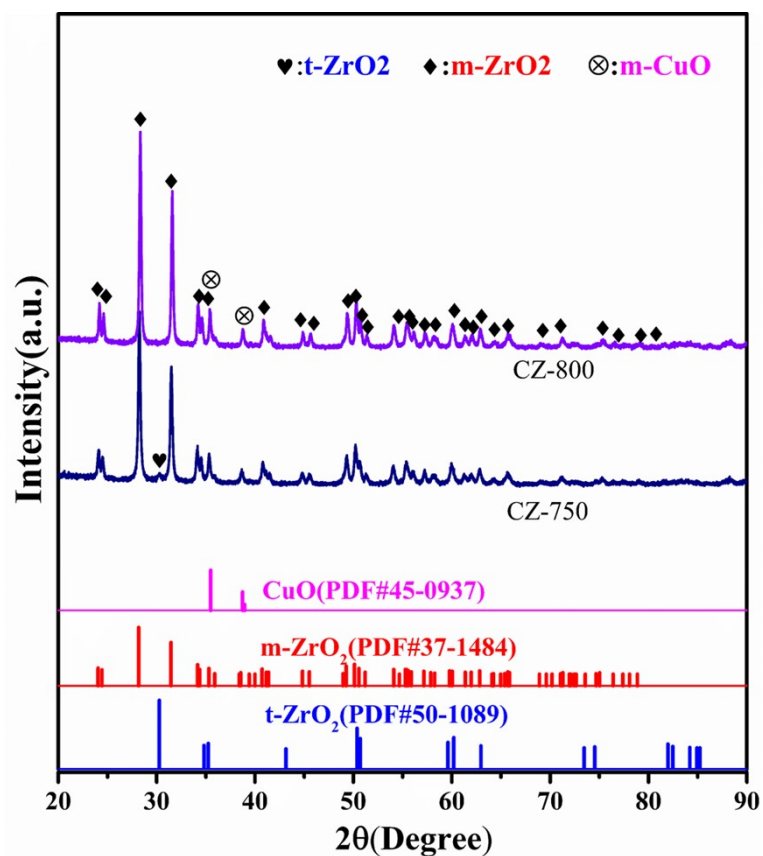


Fig. S1. XRD for the calcined catalysts CZ-750 and CZ-800.

Table S1. The particles size calculated from the XRD results.

Catalysts	d(nm)	d(nm)	d(nm)
	t-ZrO <sub>2</sub>	m-ZrO <sub>2</sub>	CuO
CZ-750	-	44.1	31.2
CZ-800	-	53.8	41.2

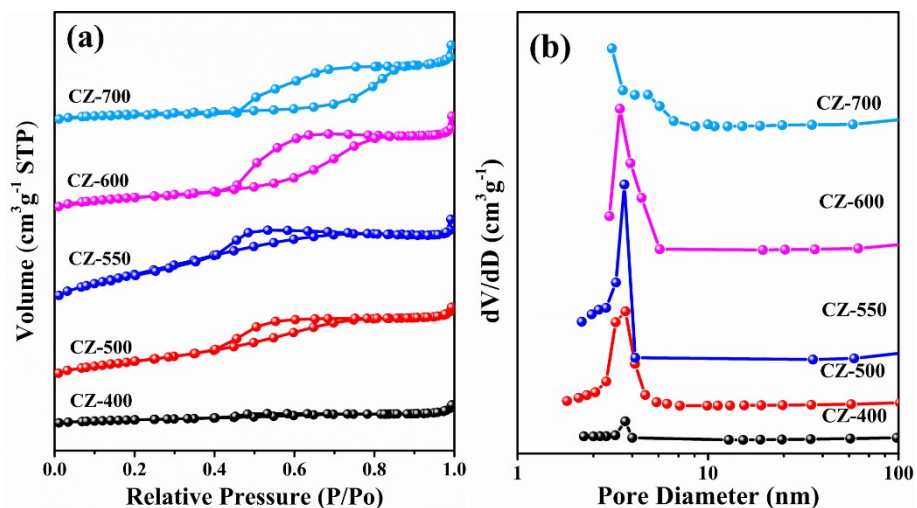


Fig. S2. N<sub>2</sub> physical adsorption-desorption curves (a) and pore distribution curves calculated by BJH methods (b) for Cu/ZrO<sub>2</sub> catalysts.

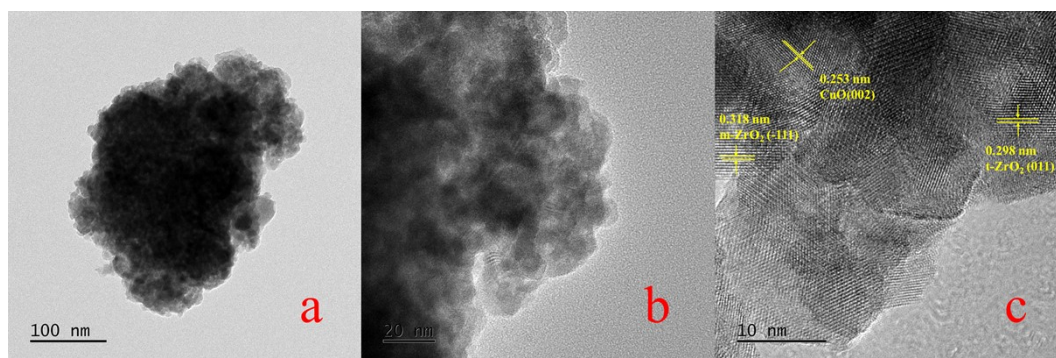


Fig. S3 . TEM images (a, b) and HRTEM (c) for the calcined CZ-600.

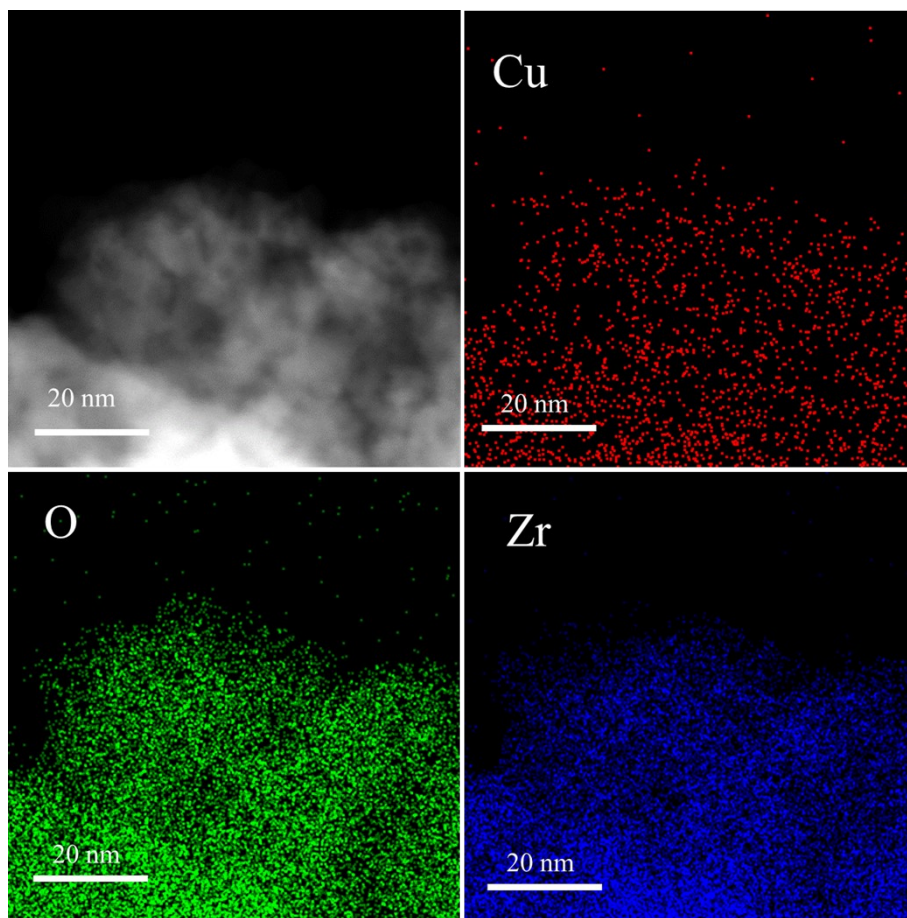


Fig. S4. Elemental mapping for the calcined CZ-600.

Table S2. Atomic ratios of calcined and reduced CZ-600 catalyst confirmed by EDX mapping.

Catalysts	Mass%				Atom%			
	O K	Cu K	Zr L	Cu/Zr	O K	Cu K	Zr L	Cu/Zr
CuZr-600 <sup>C</sup>	31.35	2.15	66.50	0.0323	71.98	1.24	26.78	0.0463
CuZr-600 <sup>R</sup>	40.75	2.13	57.12	0.0373	79.43	1.04	19.53	0.0533

C: calcined; R: reduced.

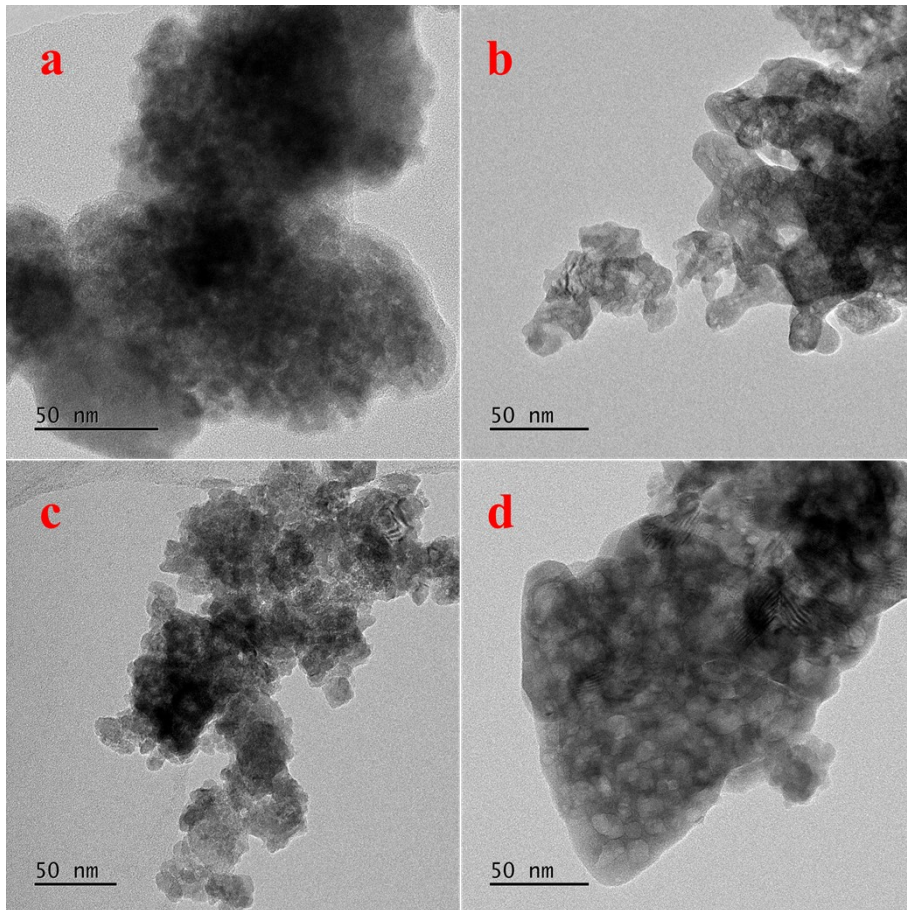


Fig. S5. TEM for reduced CZ-500 (a), CZ-550 (b), CZ-600 (c) and CZ-700 (d).

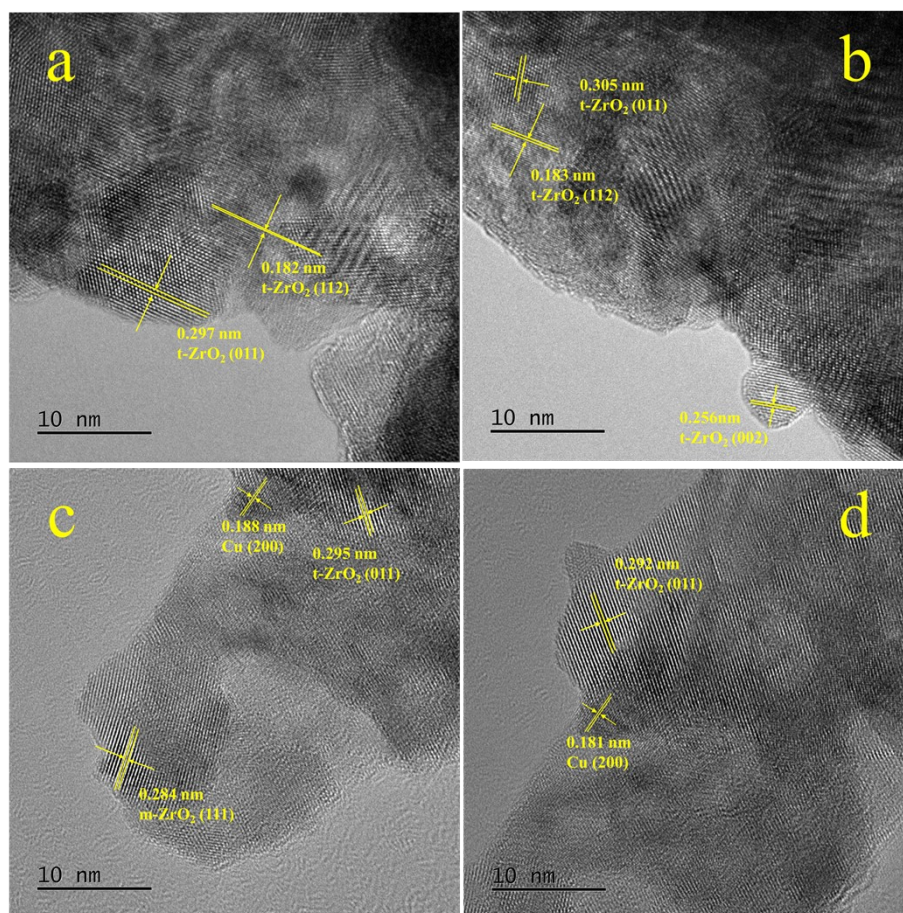


Fig. S6. HRTEM for the reduced CZ-400 (a, b) and CZ-550 (c, d).

Table S3 Catalytic performance of copper catalysts in DMO hydrogenation to EG in the reference literature.

Catalysts	Copper loading	C(DMO)	S(EG)	T/°C	P/MPa	H <sub>2</sub> /DMO	WHSV
32CLZ700 <sup>1</sup>	32 wt.%	~97%	~98%	220	2.4	80	1.2
50CZ <sup>2</sup>	50 wt.%	99%	96%	220	2.4	80	1.0
CuZnZr-0.2 <sup>3</sup>	50 wt.%	100%	92%	220	3	150	0.3
CZA-600 <sup>4</sup>	24 wt.%	100%	95%	220	2.5	160	0.3
Cu/SBA-15 <sup>5</sup>	50 wt.%	100%	99%	200	2.5	100	0.6
CuSiZr1-850 <sup>6</sup>	37 wt.%	100%	96%	190	3	150	0.3

## References

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