

Anchoring Cu Species over SiO₂ for Hydrogenation of Dimethyl Oxalate to Ethylene Glycol

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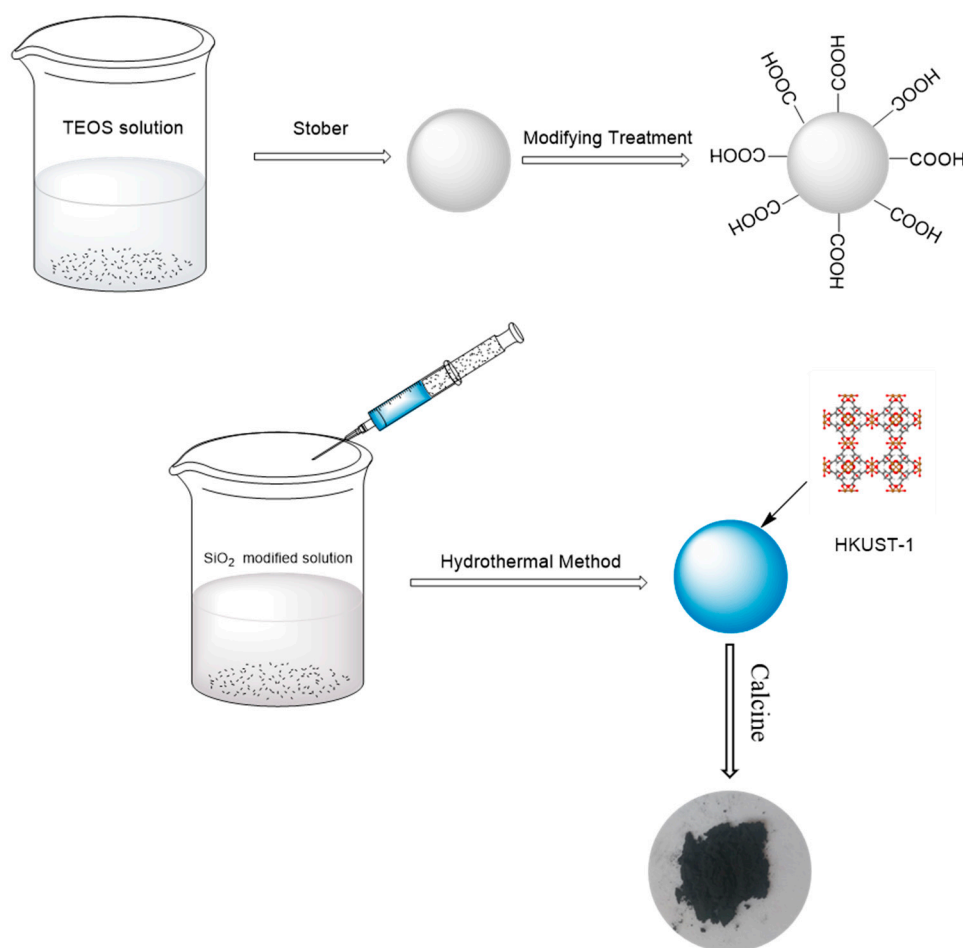


Figure S1. Diagram of catalyst preparation process

Table S1 Kinetic energy and Cu⁺ ratio in different catalysts

Catalysts	K.E. (eV) ^a	B.E. of	X _{Cu⁺} (%) ^b
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	Cu ⁺	Cu ⁰	Cu2p _{3/2} (eV)	
MOF-CmS	914	918	933.3	74.8
CS	914	917	933.0	61.6
MOF-CS	914	918	933.3	63.3
Cu ₂ O ^c	913.6	/	932.5	/
Cu ^c	/	918.3	932.7	/

^a Kinetic energy from Cu LMM peak.

^b Intensity ratio between Cu⁺ and (Cu⁺+Cu⁰) by deconvolution of Cu LMM XAES.

^c The XPS data of bulk Cu₂O and Cu were also collected by the ESCALAB250 equipment from ref.^[1]

Table S2 Catalytic performance of MOF-CmS, CS and MOF-CS samples at 200 °C with WLHSV_{DMO}= 0.82 h⁻¹.

Reaction T = 200 °C					
Catalysts	WLHSV _{DMO}	Conv. _{DMO}	Selec. _{EG}	Selec. _{MG}	Selec. _{others}
	/h ⁻¹	/%	/%	/%	/%
MOF-CmS	0.82	100	98.1	1	0.9
CS	0.82	86.9	49.7	48.6	1.65
MOF-CS	0.82	68.4	41.7	57.3	1.0

Table S3 Physicochemical properties of different catalysts

Catalysts	Cu precursor	Cu loading (wt%) ^a	Surface Area (m ² g ⁻¹)	S _{Cu} (m ² g ⁻¹) ^b	Cu dispersion (%) ^b	Colour
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HKUST-1	Cu(OAc) ₂	21.21	336	/	/	blue
SiO ₂	/	/	89	/	/	white
MOF-CmS	HKUST-1	13	154	41.7	49.4	clear blue
CS	Cu(OAc) ₂	17	70	12	10.8	dark grey
MOF-CS	HKUST-1	10	110	15	23.1	clear blue

^aCu loading obtained from ICP-OES.

^bCu metallic surface area and dispersion collected by N₂O titration.

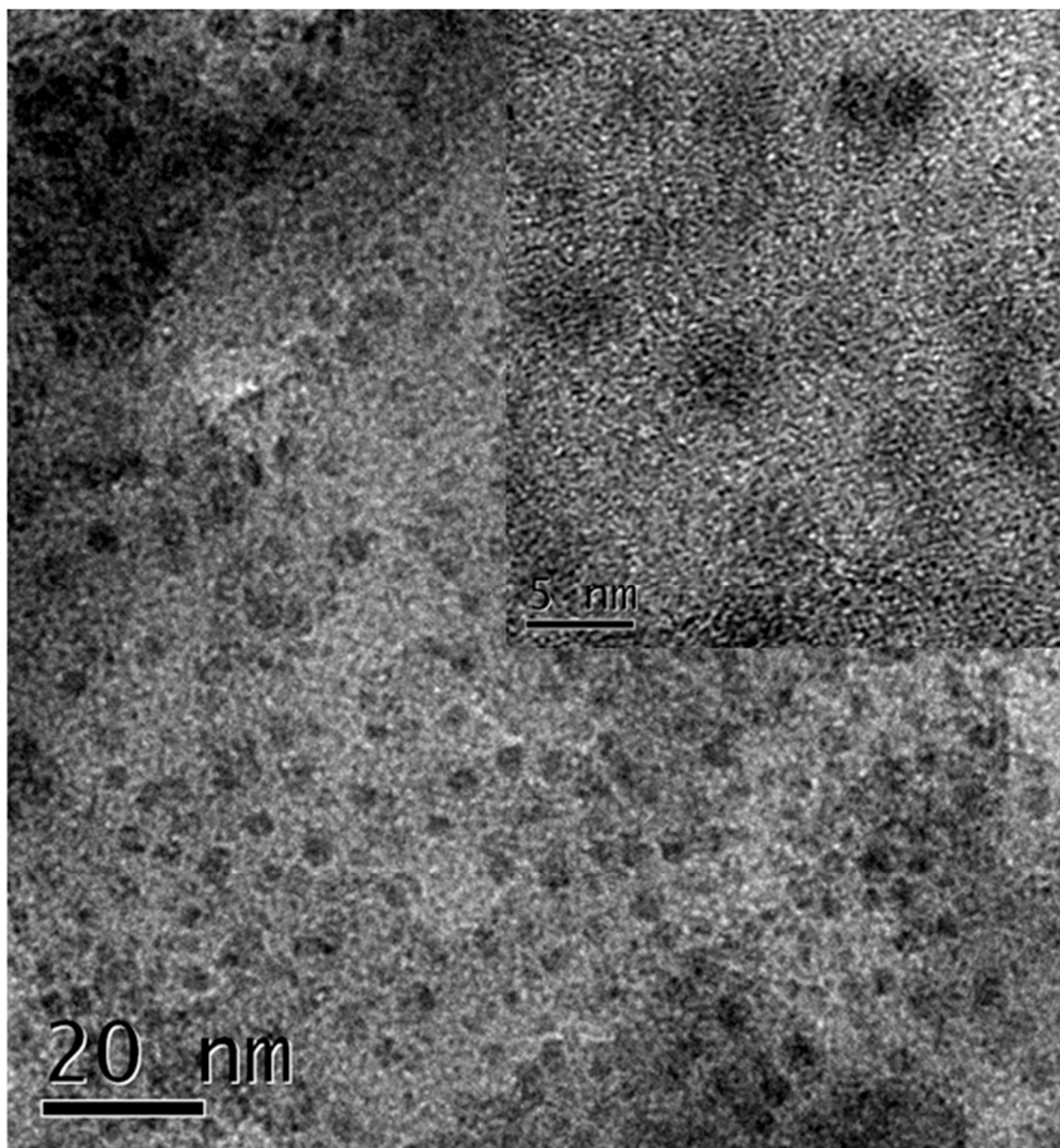


Figure S2. TEM images of the MOF-CmS catalyst

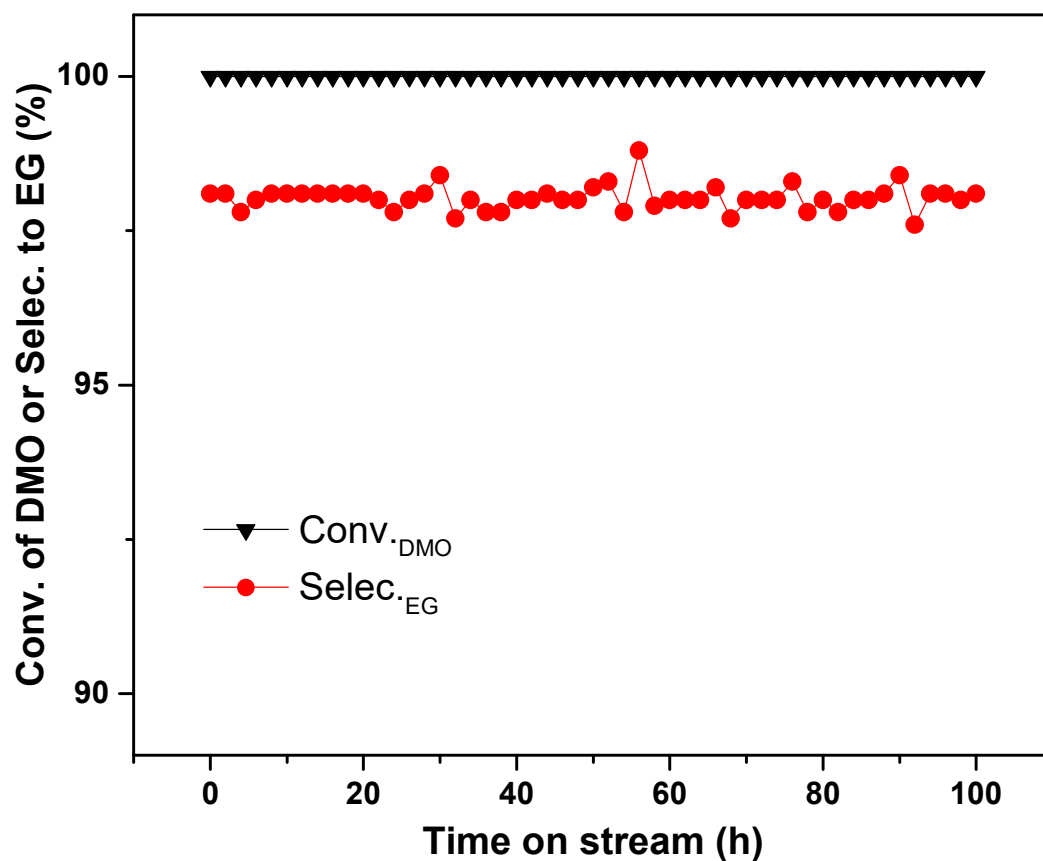


Figure S3. Long-term stability test of MOF-CmS sample at reaction temperature of 200 °C and $\text{WLHSV}_{\text{DMO}}$ of 0.82 h^{-1} .

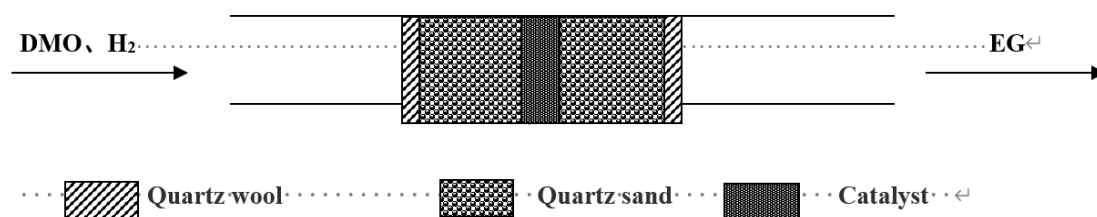


Figure S4. Reaction tube diagram

Reference

- [1] Li, X.L.; Xie, F.Y.; Gong, L.; Zhang, W.H.; Yu, X.L.; Chen, J. Effect of argon ion bombardment on copper oxide studied by X-ray photoelectron spectroscopy. *J. Instrumental Anal.* **2013**, *32*, 535–540.