

Supporting information

Zeolite Confinement and Defect Engineering Steering the Photocatalytic Conversion of CO₂ to C₂H₄

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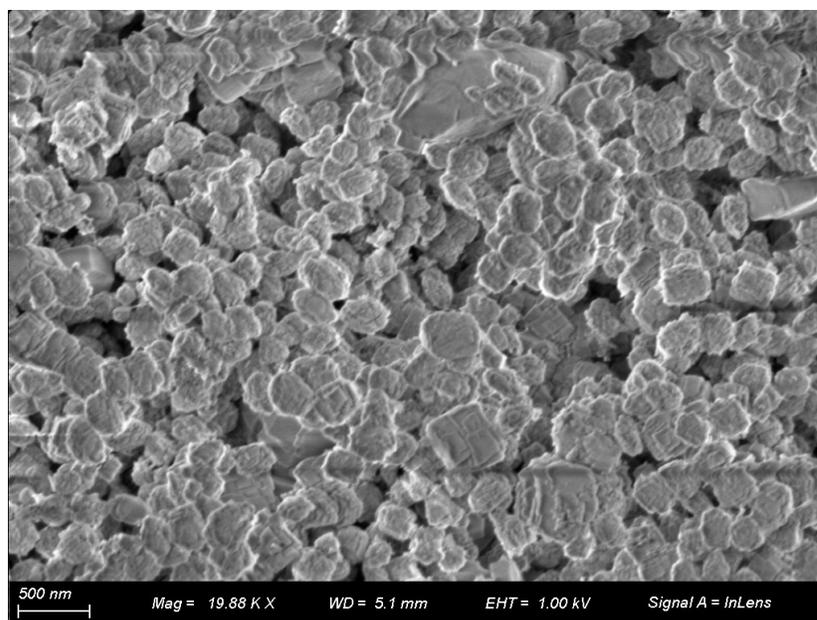


Figure S1. The SEM images of the sample zeolite TS-1

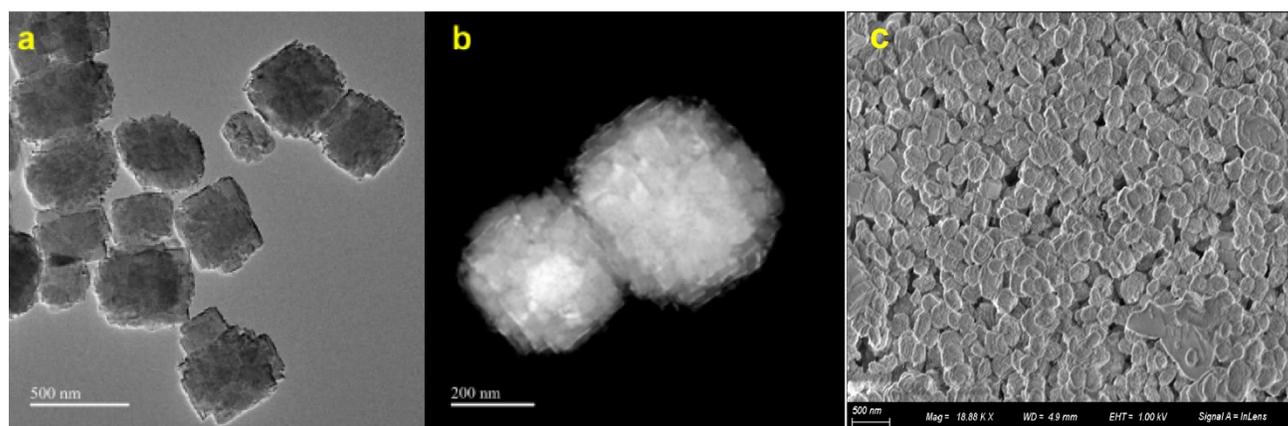


Figure S2. (a-b) The TEM and (c) SEM images of the sample Ag-Cu_xO/TS-1.

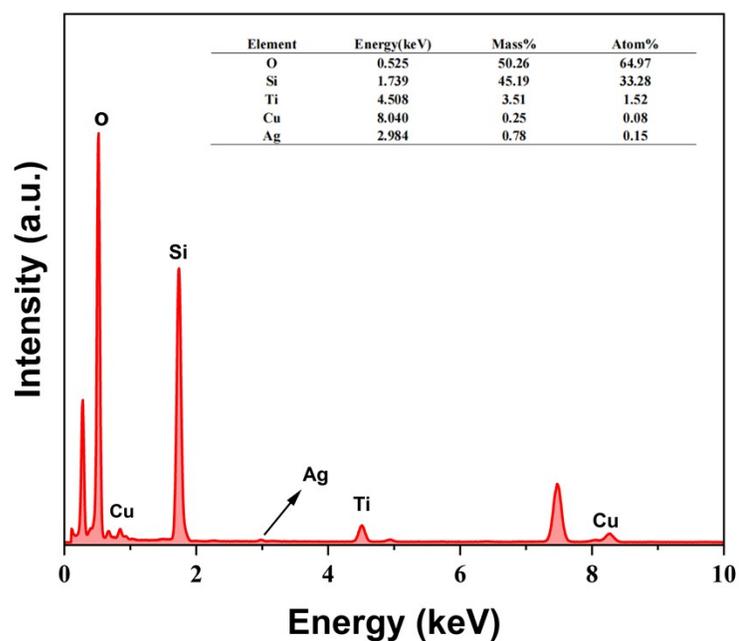


Figure S3. The corresponding EDX spectrum of the cross-section of Ag-Cu_xO/TS-1.

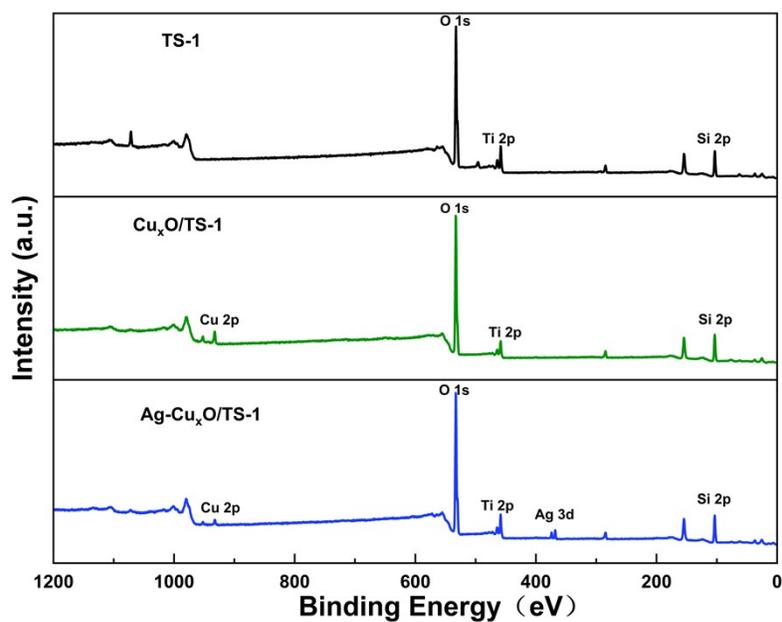


Figure S4. The survey spectrum of the samples TS-1, Cu_xO/TS-1 and Ag-Cu_xO/TS-1.

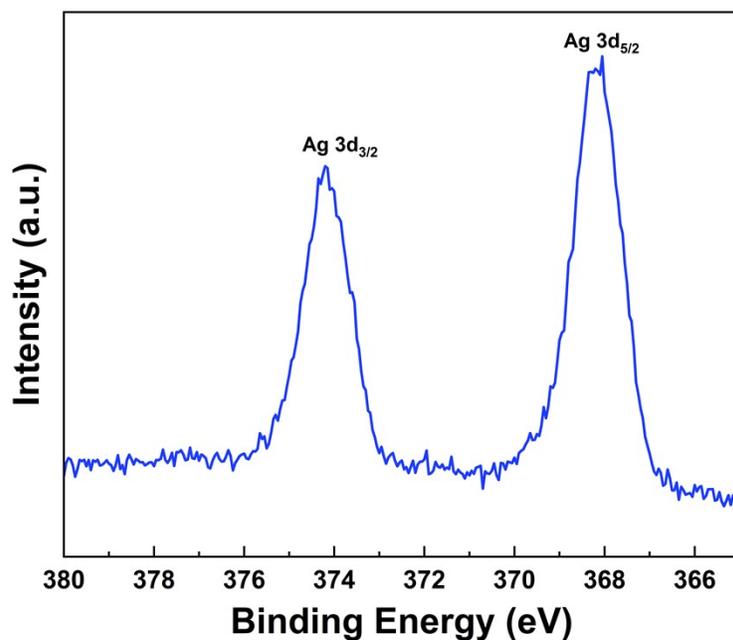


Figure S5. XPS fine spectra of Ag 3d of the sample Ag-Cu_xO/TS-1.

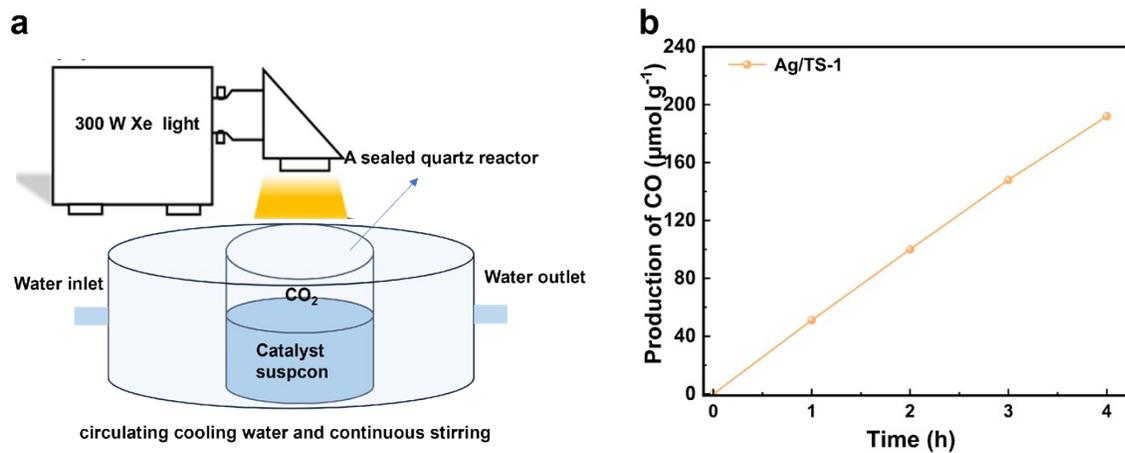


Figure S6. a) The schematic representations of the photoreactor and b) the light-induced CO₂ reduction performance over the pure Ag/TS-1 sample.

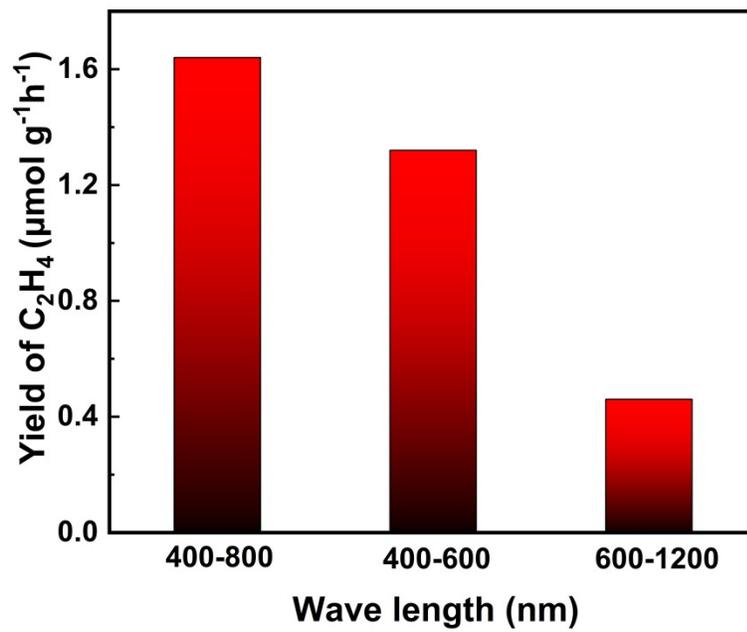


Figure S7. The C₂H₄ yield on the sample Ag-Cu_xO/TS-1 with different wave length of light.

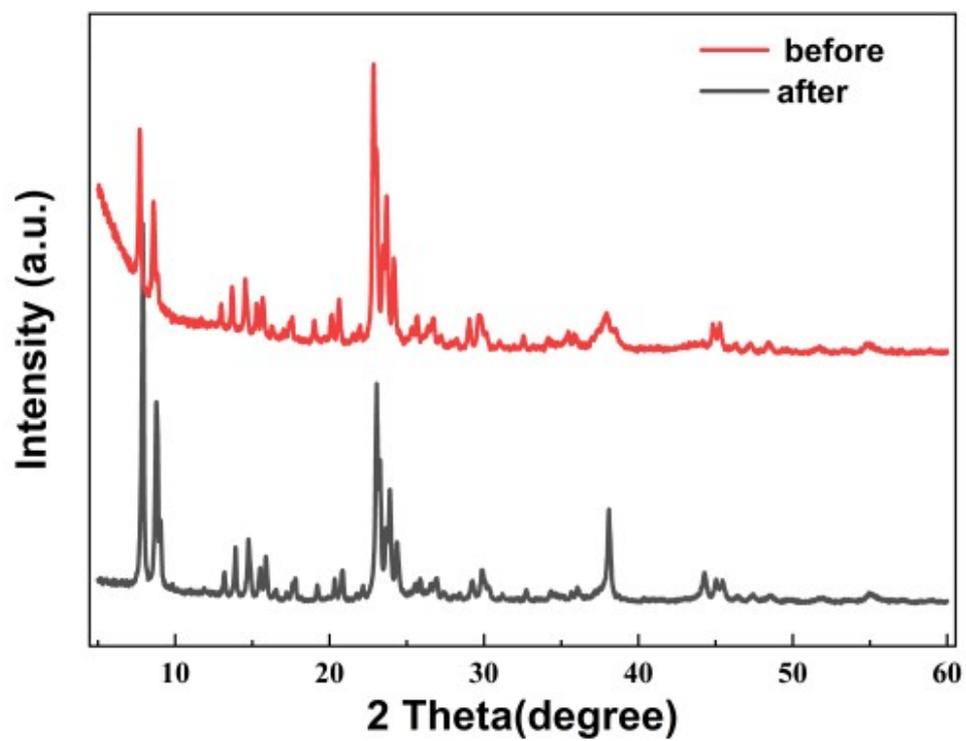


Figure S8. XRD patterns of the sample Ag-Cu_xO/TS-1 after photocatalytic reaction.

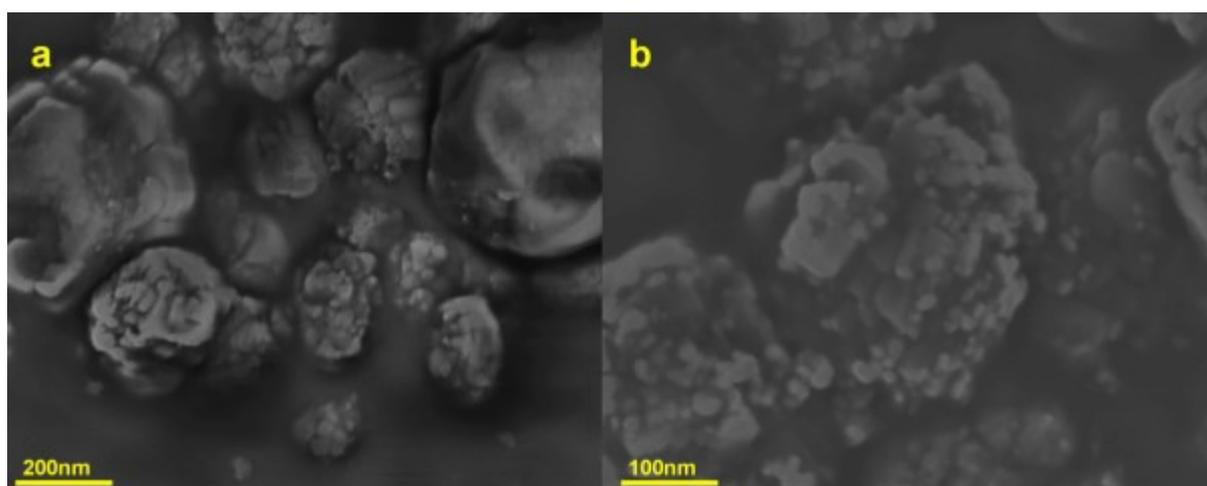


Figure S9. The SEM images of the sample Ag-Cu_xO/TS-1 after photocatalytic reaction.

Table S1. Composition and textural properties of the zeolite TS-1 and Cu_xO/TS-1 and Ag-Cu_xO/TS-1 samples.

Samples	Si/Ti (cm ³ g ⁻¹)	V_{total} (cm ³ g ⁻¹)	S_{meso} (m ² g ⁻¹)	d_{meso} (nm)	Ag content (wt%)
TS-1		0.22	362.55	2.74	/
Cu _x O/TS-1		0.21	355.63	2.67	/
Ag-Cu _x O/TS-1		0.21	351.82	2.62	2.0

Table S2. The XPS surface composition analysis of Ti, O, Ag and Cu of the catalyst TS-1 and Cu_xO/TS-1 and Ag-Cu_xO/TS-1 and percentage of total area.

Element	TS-1		Cu _x O/TS-1		Ag-Cu _x O/TS-1	
	Binding	Percentag	Binding Energy	Percentag	Binding Energy	Percentage
	Energy (eV)	e (%)	(eV)	e (%)	(eV)	(%)
O 1s	533.50 (O _C)	77.05	533.50 (O _C)	83.77	533.44 (O _C)	82.98
	530.23 (O _L)	22.95	530.43 (O _L)	16.23	530.33 (O _L)	17.02
Ag 3d	/	/	/	/	368.12 (Ag 3d _{5/2})	62.23
	/	/	/	/	374.18 (Ag 3d _{3/2})	37.77
Cu 2p	/	/	932.72(Cu 2p _{3/2})	67.40	932.60 (Cu 2p _{3/2})	66.72
	/	/	952.38(Cu 2p _{1/2})	32.60	952.18(Cu 2p _{1/2})	33.28