Supporting Information

For

One-pot synthesis of 1,4-butanediol via the deep hydrogenation of maleic anhydride over Cu-xMo/SiO_2 catalysts

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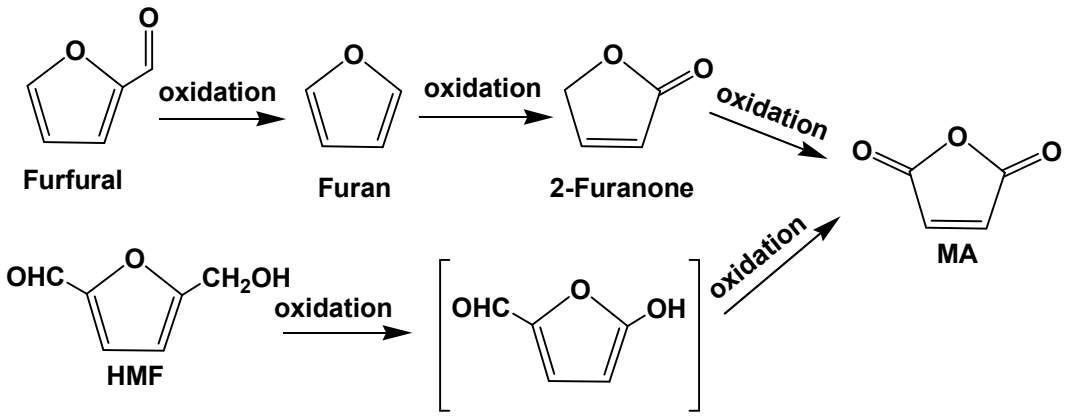

Scheme S1 Selective oxidation of furfural or HMF to maleic anhydride.

Table S1 Quantitative acidity according to NH_3-TPD for various Cu-xMo/SiO_2 catalysts.

Catalyst	Acid amount ($mmol \cdot g^{-1}$)			
	Weak	Moderate	Strong	Total acidity
Cu/SiO_2	0.15	0.14	0.08	0.37
$Cu\text{-}0.02Mo/SiO_2$	0.22	0.39	0	0.61
$Cu\text{-}0.03Mo/SiO_2$	0.22	0.28	0	0.50
$Cu\text{-}0.1Mo/SiO_2$	0.35	0.36	0	0.71
$Cu\text{-}0.25Mo/SiO_2$	0.22	0.37	0	0.59
Mo/SiO_2	0	0	0	0

Table S2 Quantitative hydrogen uptake for various Cu-xMo/SiO_2 catalysts.

Sample	Cu content (wt%)	Amount of H_2 consumption ($mmol/g_{Cu}$)
Cu/SiO_2	37.7	4.38
Cu-0.03Mo/SiO_2	32.1	5.54
Cu-0.25Mo/SiO_2	31.7	5.84

Table S3 Physicochemical properties of the spent Cu-0.03Mo/SiO_2 catalyst.

Catalyst	S_{BET} [a] ($m^2 \cdot g^{-1}$)	Vp [a] ($cm^3 \cdot g^{-1}$)	Cu loading [b] (wt%)	d_{Cu} [c] (nm)
Cu-0.03Mo/SiO_2-used	291	0.50	31.4	14.1
Cu-0.03Mo/SiO_2-fresh	357	0.61	32.1	3.8

[a] Determined by N_2 physisorption.

[b] Determined by ICP-OES analysis.

[c] Cu particle size was calculated by the Scherrer equation.

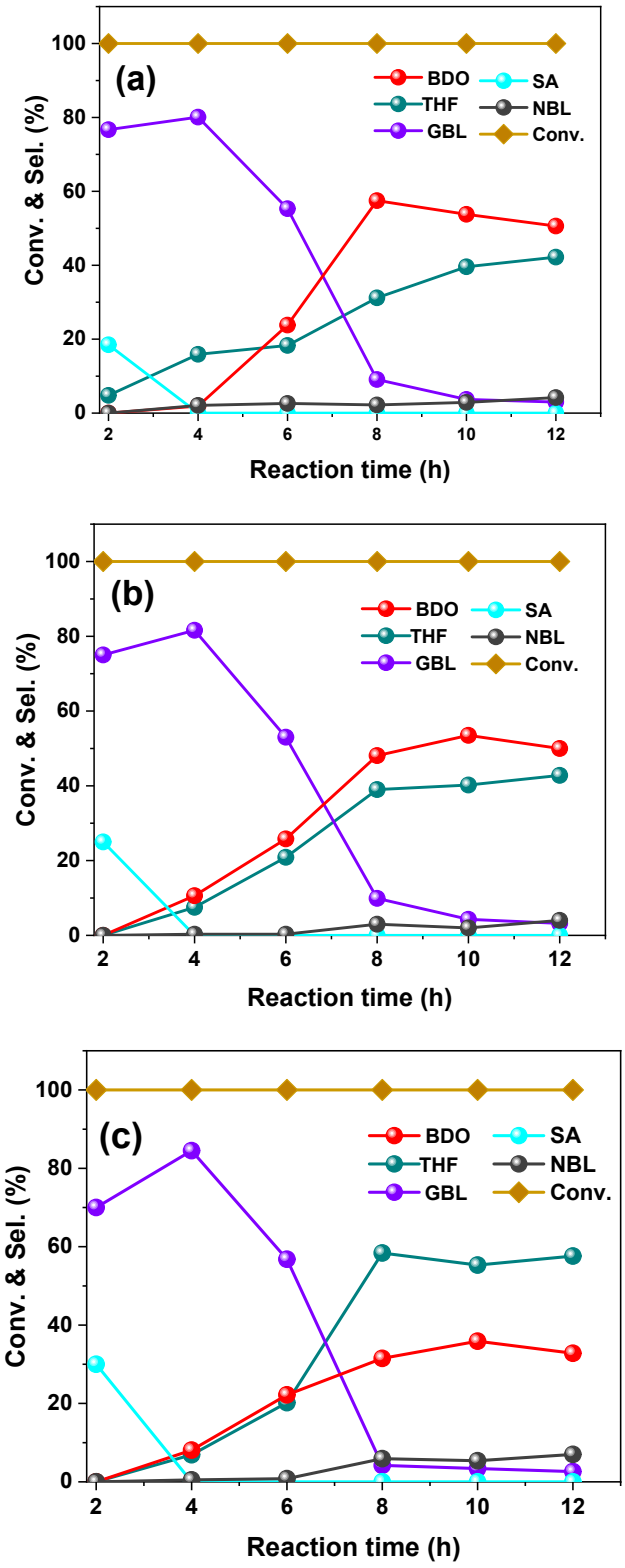

Fig. S1 Kinetic profiles for the hydrogenation of MA with (a) Cu-0.02Mo/SiO_2, (b) Cu-0.1Mo/SiO_2, and (c) Cu-0.25Mo/SiO_2 catalysts. General conditions**:** 0.2 g of catalyst, 0.2 g of MA, 10 mL of 1,4-dioxane, 5MPa H_2, 200 °C.

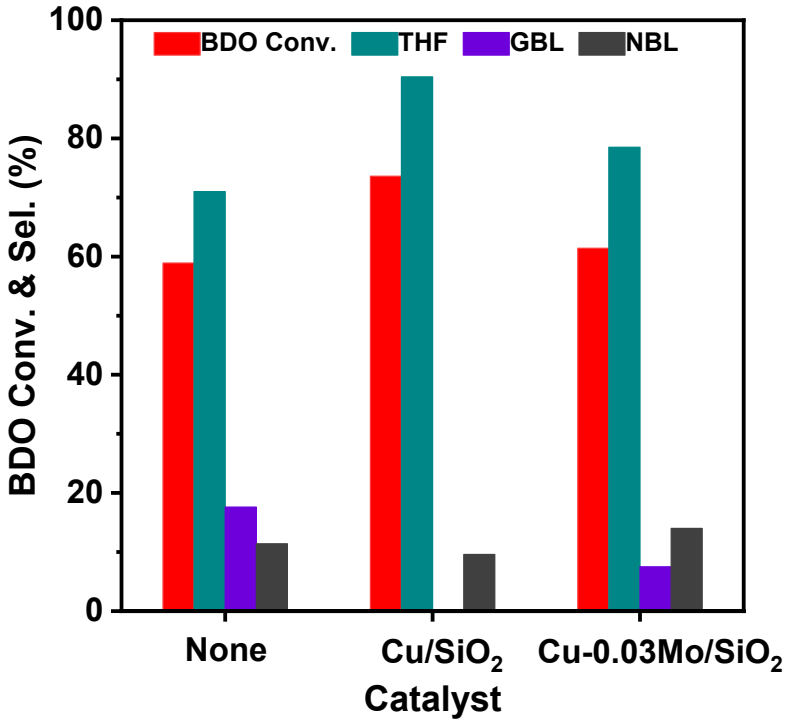

Fig. S2 Product distribution in the hydrogenation of BDO. Reaction conditions: 0.2 g of catalyst, 0.2 g of BDO, 10 mL of 1,4-dioxane, 200 °C, 5MPa H_2, 10 h.

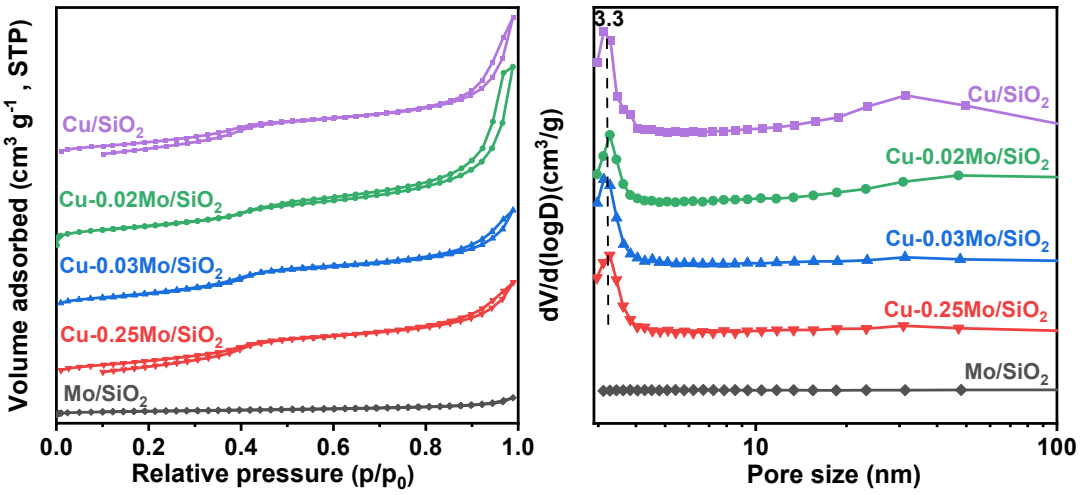

Fig. S3 (a) N_2 adsorption-desorption isotherms and (b) pore size distributions of various Cu-xMo/SiO_2 catalysts.

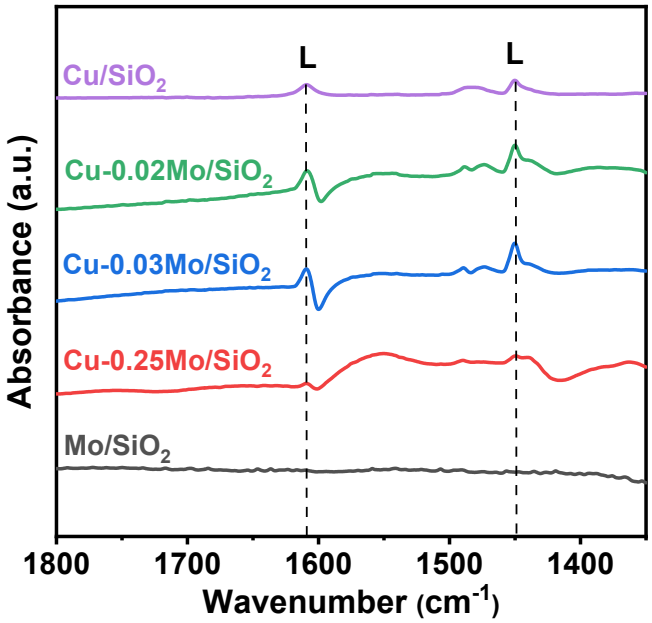

Fig. S4 FTIR spectra of pyridine adsorbed on Cu-xMo/SiO_2 catalysts at 150 °C.

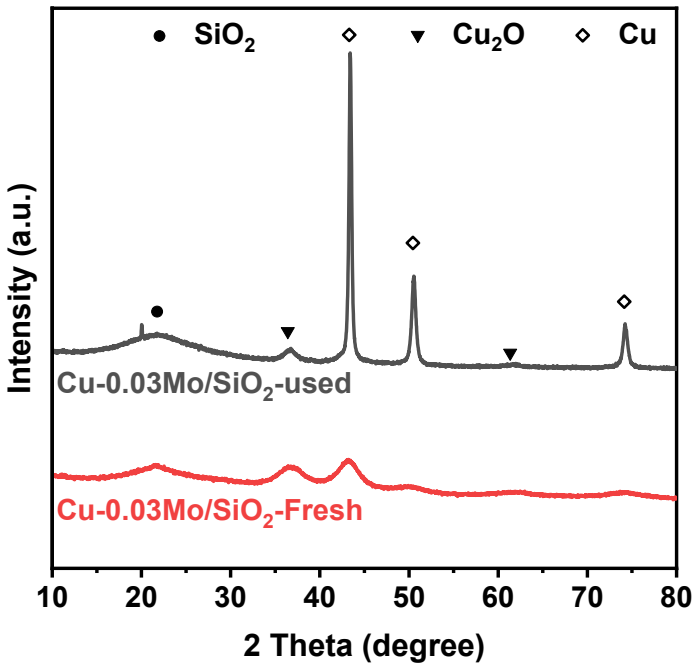

Fig. S5 XRD patterns of Cu-0.03Mo/SiO_2 before and after long-term stability test.

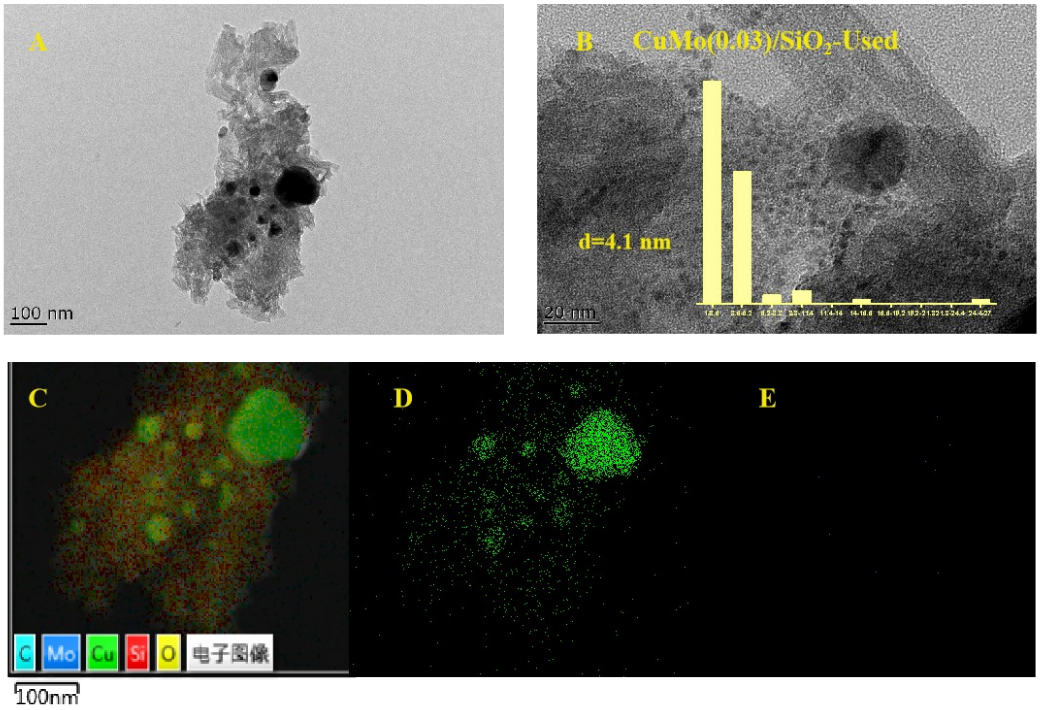

Fig. S6 (A) TEM image and (B) high-resolution TEM image of used Cu-0.03Mo/SiO_2. (C) HAADF-STEM-EDX mapping of used Cu-0.03Mo/SiO_2 and (D) Cu element, (E) Mo element.

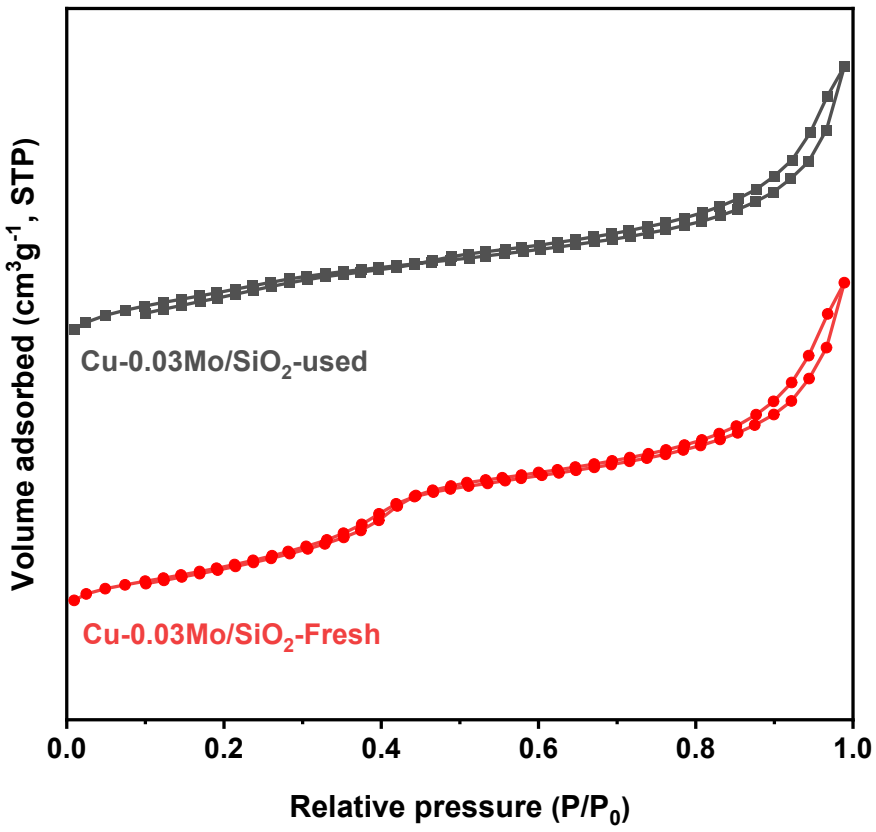

Fig. S7 N_2 sorption isotherms of the Cu-0.03Mo/SiO_2 catalyst before and after long-term stability test.

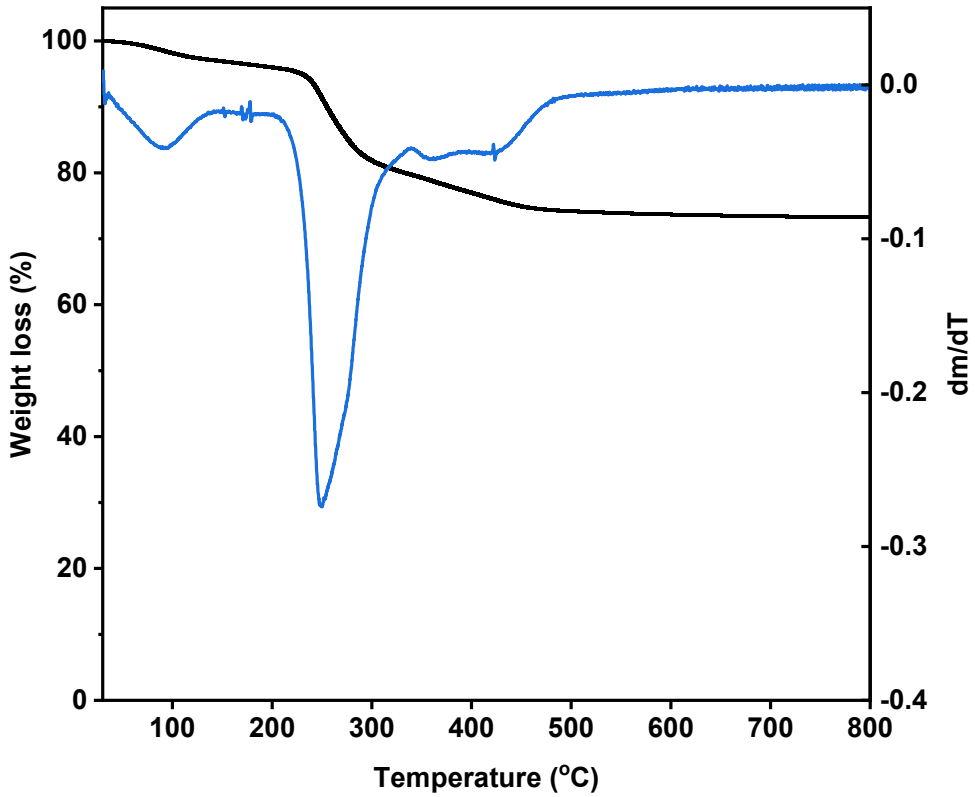

Fig. S8 TG curve of the used Cu-0.03Mo/SiO_2 catalyst.