Supporting information for

Insights into the influence of various impurities on the stability of Cu/SiO_2 catalyst for the hydrogenation of dimethyl oxalate to ethylene glycol

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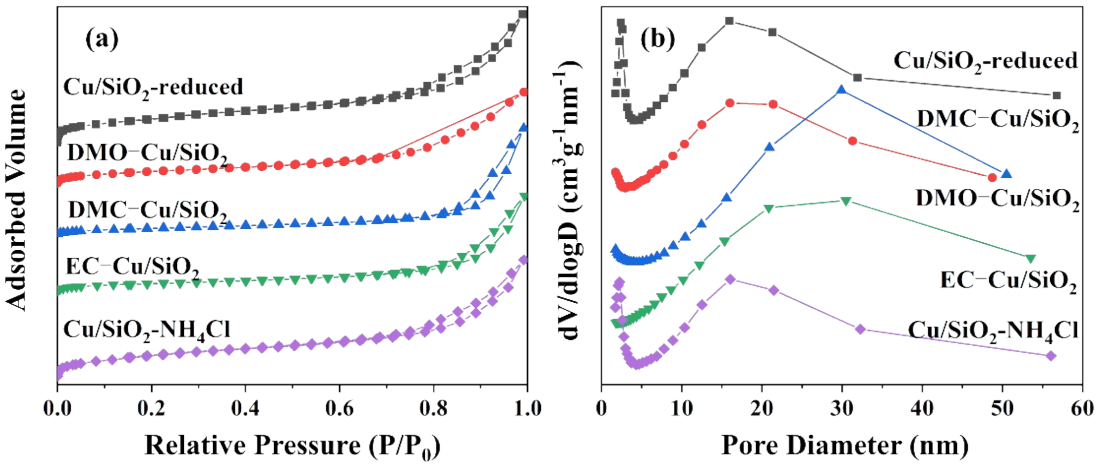


Figure S1. (a) N_2 adsorption-desorption isotherms and (b) pore size distribution curves of the reduced and used Cu/SiO_2 catalysts.

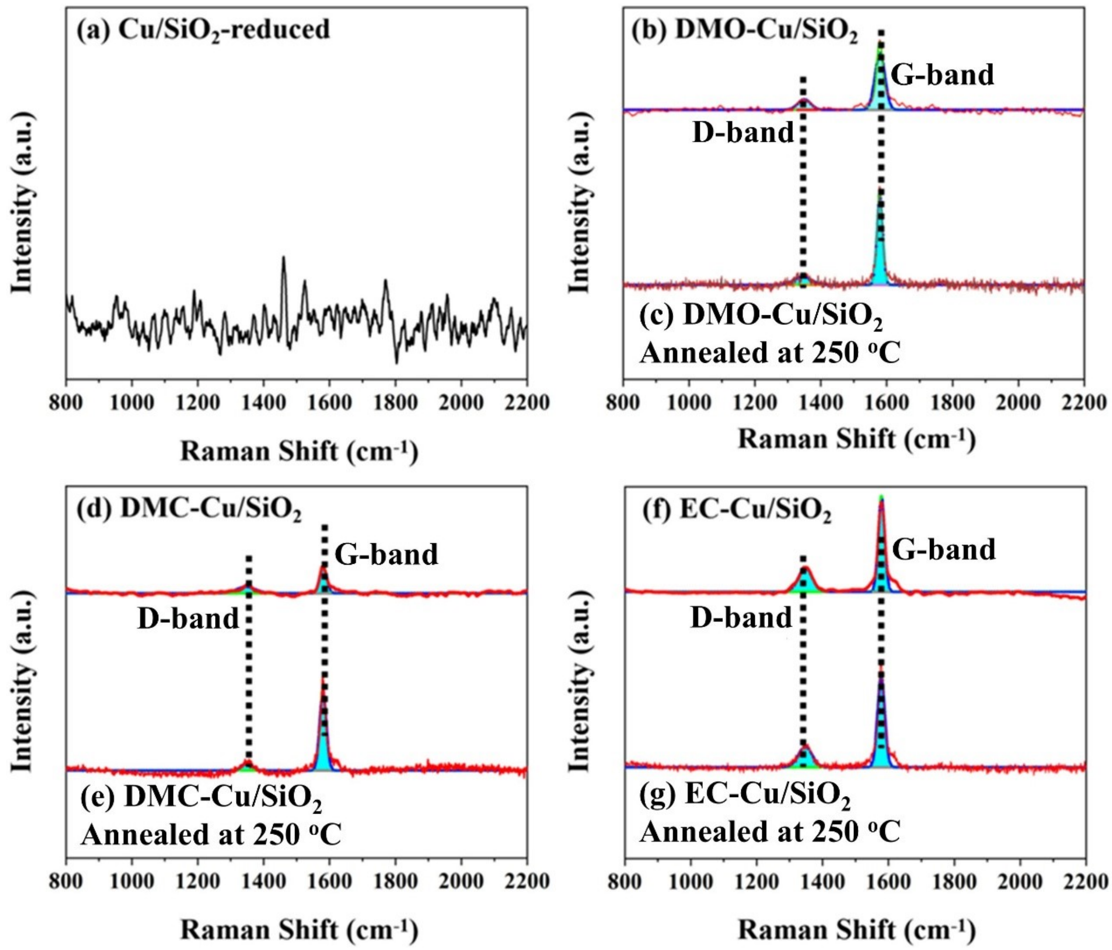


Figure S2. Raman spectra of the reduced and used Cu/SiO_2 catalysts with different feedstocks. (a) reduced, (b, d, f) after reaction, (c, e, g) after reaction and annealed at 250 °C.

Table S1. Actual weight loss of the used Cu/SiO_2 catalysts calculated from TG analysis.

Catalyst	Total loss (%)	Soft coke (%)	Heavy coke (%)
DMO-Cu/SiO_2	2.79	2.19	0.60
DMC-Cu/SiO_2	4.44	3.33	1.11
EC-Cu/SiO_2	7.13	6.42	0.71
Cu/SiO_2-NH_4Cl	1.97	1.35	0.62

Table S2. I_D/I_G values derived from Raman spectra of the used Cu/SiO_2 catalysts with different feedstocks.

	DMO-Cu/SiO_2	DMC-Cu/SiO_2	EC-Cu/SiO_2
I_D/I_G (before annealing)	0.18	0.24	0.26
I_D/I_G (after annealing)	0.09	0.16	0.22

Table S3. Main carbonaceous deposit species in the used Cu/SiO_2 catalysts and the properties.

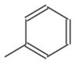
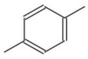
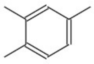
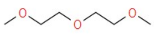
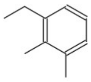
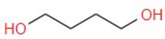
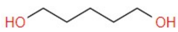
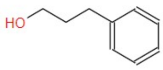
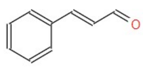
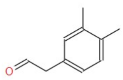
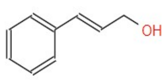
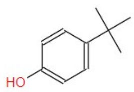
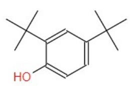
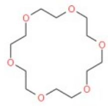
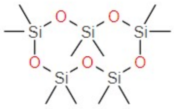
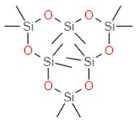
Name	Structural formula	Molecular formula	Relative molecular mass	Boiling point (°C)
n-heptane		C_7H_{16}	100.2	98
toluene		C_7H_8	92.1	111
p-xylene		C_8H_{10}	106.2	138
1,2,4-trimethylbenzene		C_9H_{12}	120.2	168
diethylene glycol dimethyl ether		$C_6H_{14}O_3$	134.2	159
1,2-dimethyl-3-ethylbenzene		$C_{10}H_{14}$	134.2	194
1,4-butanediol		$C_4H_{10}O_2$	90.1	228
1,5-pentanediol		$C_5H_{12}O_2$	104.1	239
3-phenylpropanol		$C_9H_{12}O$	136.2	238
trans-cinnamaldehyde		C_9H_8O	132.2	250
3,4-xylylacetaldehyde		$C_{10}H_{12}O$	148.2	245
cinnamyl alcohol		$C_9H_{10}O$	134.2	250
4-tert-butylphenol		$C_{10}H_{14}O$	150.2	238
2,4-di-tert-butylphenol		$C_{14}H_{22}O$	206.3	265

Table S3. Main carbonaceous deposit species in the used Cu/SiO_2 catalysts and the properties (continued).

Name	Structural formula	Molecular formula	Relative molecular mass	Boiling point (^oC)
18-crown-6		$C_{12}H_{24}O_6$	264.3	395
decamethylcyclopentasiloxane		$C_{10}H_{30}O_5Si_5$	370.8	90
dodecane		$C_{12}H_{26}$	170.3	215
dodecamethylcyclohexasiloxane		$C_{12}H_{36}O_6Si_6$	444.9	245