Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

SUPPORTING INFORMATION

Cu/Mn co-Loaded Hierarchically Porous Zeolite Beta：A Highly Efficient Synergetic Catalyst for Soot Oxidation

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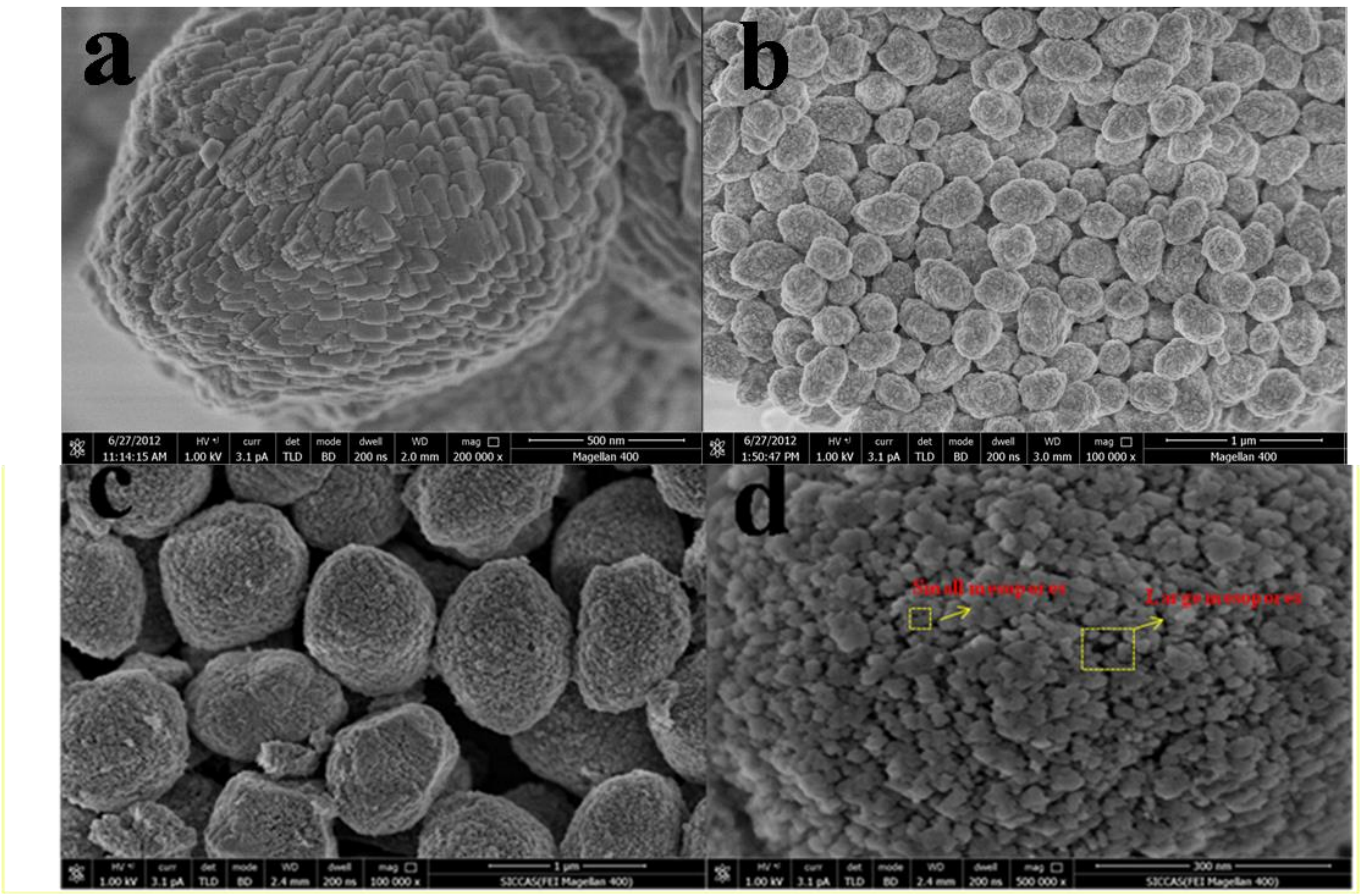

Figure S1. FE-SEM images of the samples a) Beta, b) MBeta and c-d) HBeta at low and high-magnifications.

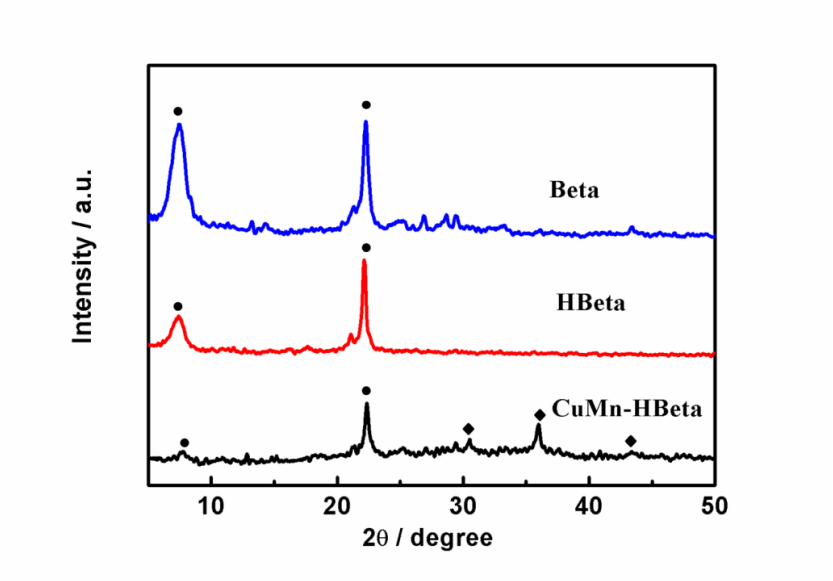

Figure S2. XRD profiles of the samples Beta, HBeta and CuMn-HBeta (●: zeolite Beta; ◆$Cu_{1.5}Mn_{1.5}O_4$).

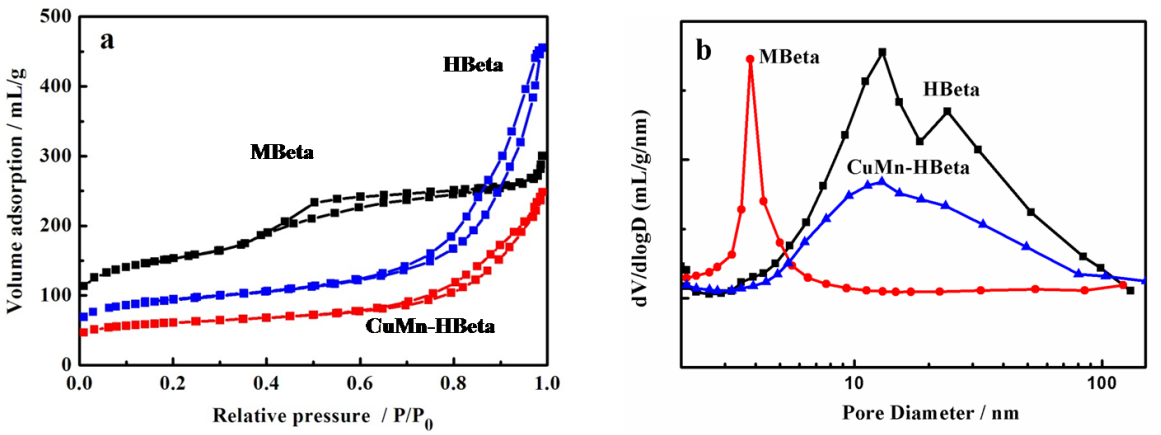

Figure S3. a) N_2 adsorption/desorption isotherms and b) the corresponding pore size distributions of the samples MBeta, HBeta and CuMn-HBeta.

Table S1. The Si/Al ratios, BET surface areas, pore volumes and mesopore sizes of the synthesized catalysts.

Sample	*Si/Al*	S_{total} (m^2/g)	S_{meso} (m^2/g) [a]	V_{total} (cm^3/g)	V_{meso} (cm^3/g) [b]	d_{meso} (nm)
Beta	25	526	-	0.21	-	-
MBeta	22	583	208	0.41	0.30	3.8
HBeta	10	402	281	0.65	0.58	7-60
CuMn-HBeta	12	289	196	0.42	0.36	7-50
CuMn-Al-MCM-41	16	634	634	0.45	0.45	7-50
CuMn-HBeta (aged)	12	268	185	0.39	0.34	7-50

[a]S_{meso} is given by the difference between S_{total} and S_{micro}; [b]V_{meso} is given by the difference between V_{total} and V_{micro};

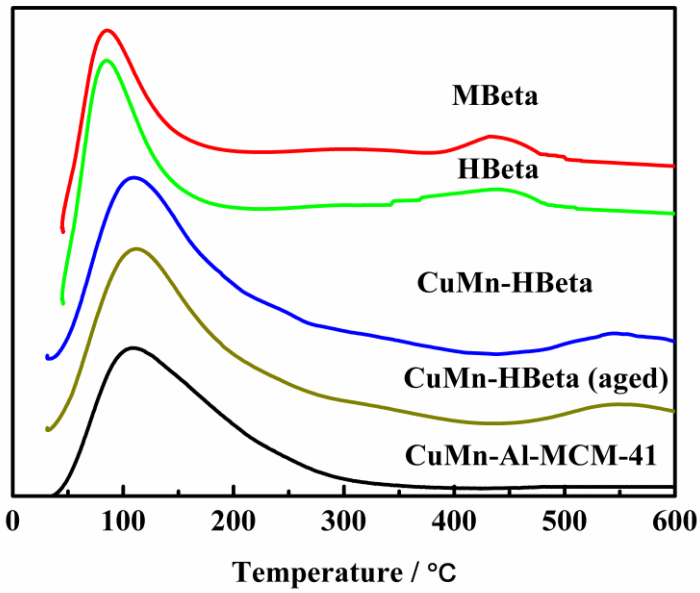

Figure S4. NH_3-TPD profiles of CuMn-HBeta and the reference CuMn-Al-MCM-41 with a similar pore size of 7-50 nm.

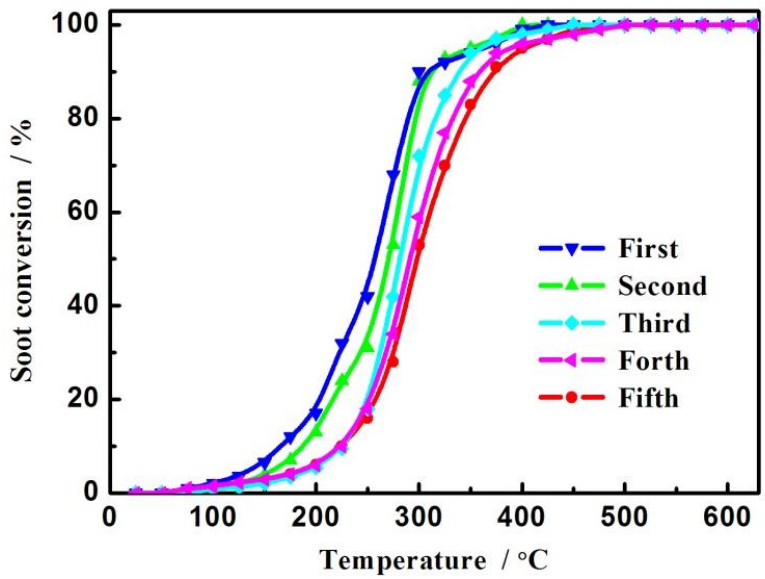

Figure S5. The reusability of the sample CuMn-HBeta in the soot catalytic oxidation (Reaction condition: 10% O2; 500 ppm NO in N2; total flow is 200 mLmin-1; the space velocity is 120000 h-1; W/F = 0.03 (g·s)/mL; the mass ratio (catalyst/soot) is 10:1).

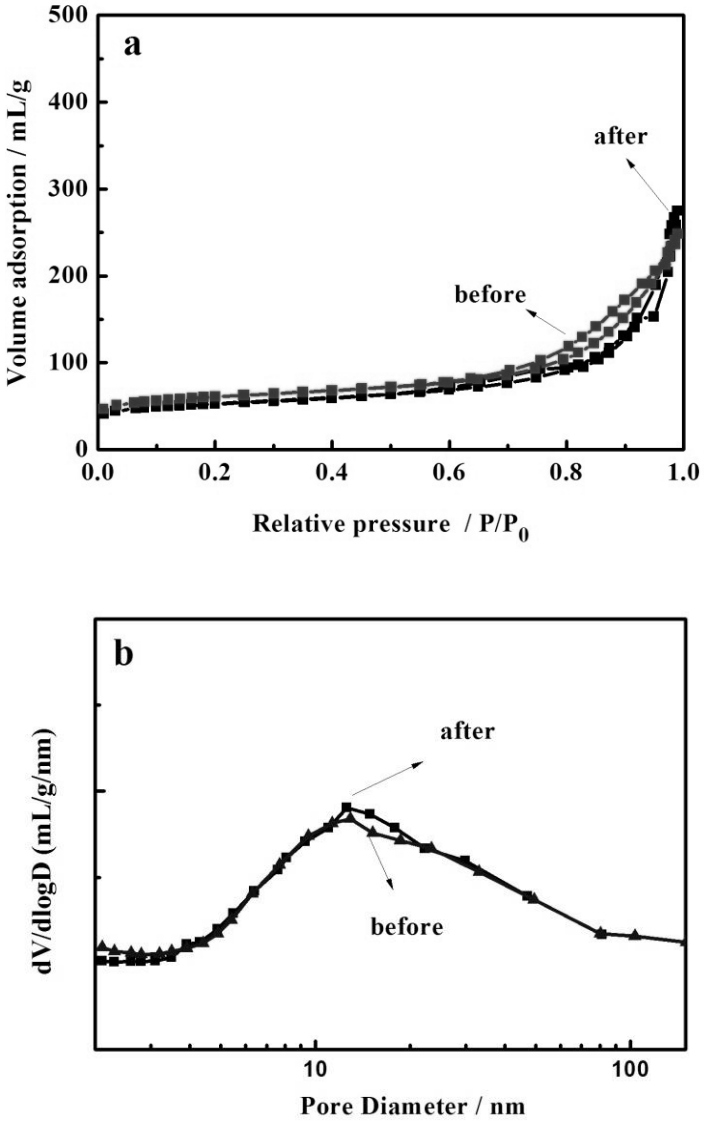

Figure S6. a) N_2 adsorption/desorption isotherms and b) the corresponding pore size distributions of the sample CuMn-HBeta before and after aging.

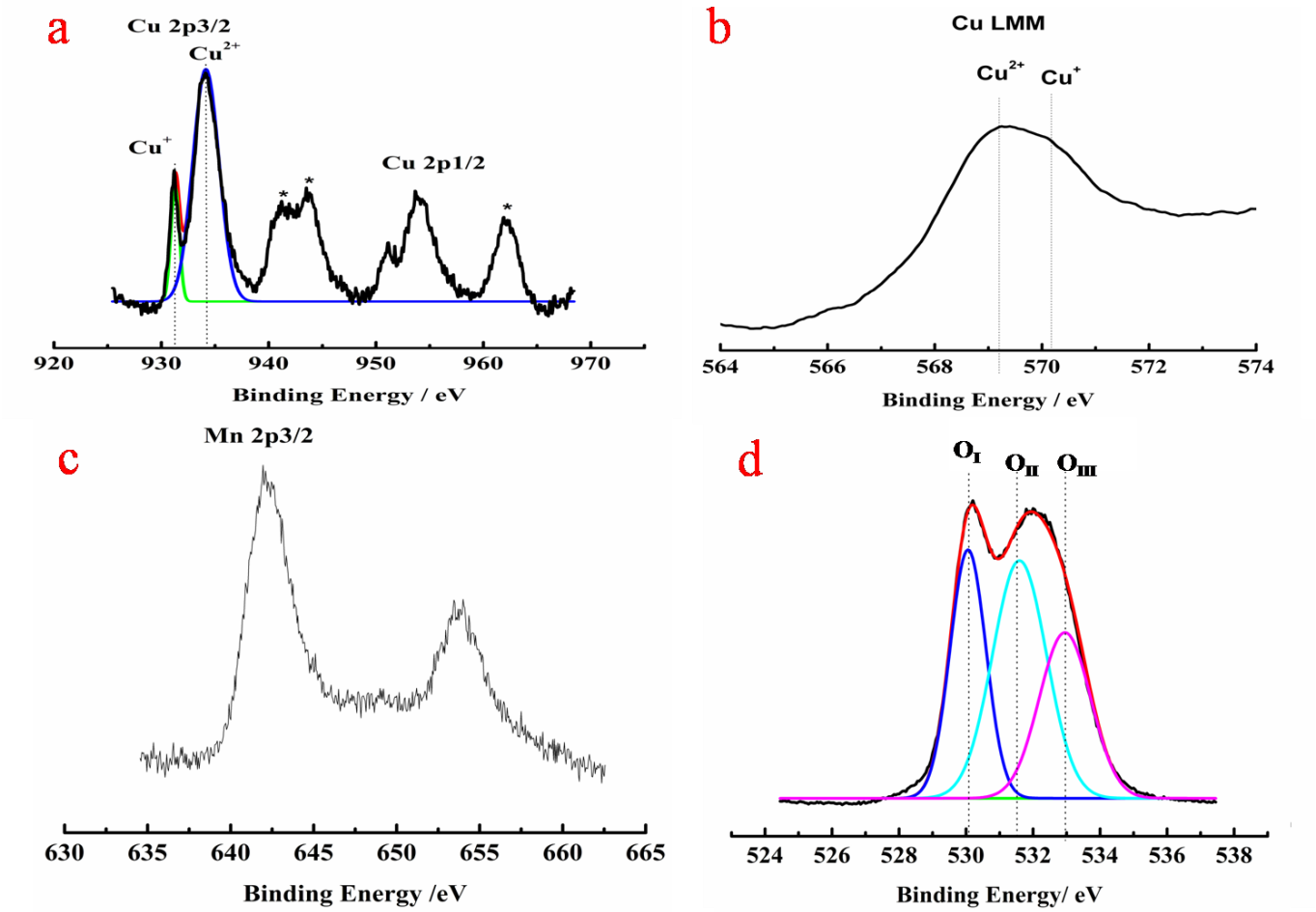

Figure S7. a) Cu 2p photoeletron spectrum, b) Cu LMM Auger spectrum, c) Mn 2p and d) O 1s photoelectron spectra of CuMn-HBeta. Peak fitting is carried out on the 2p 3/2 peak of Cu and Mn element.

Table S2. The XPS surface composition analysis of Cu and O of the catalyst CuMn-HBeta: binding energy (eV), percentage of total area.

Element	Cu		O		
	Cu^{+}	Cu^{2+}	O_I	O_{II}	O_{III}
Binding Energy / eV	931.3	934.1	530.1	531.6	532.9
Percentage of total area./ %	15.8	74.2	31.4	39.9	28.7

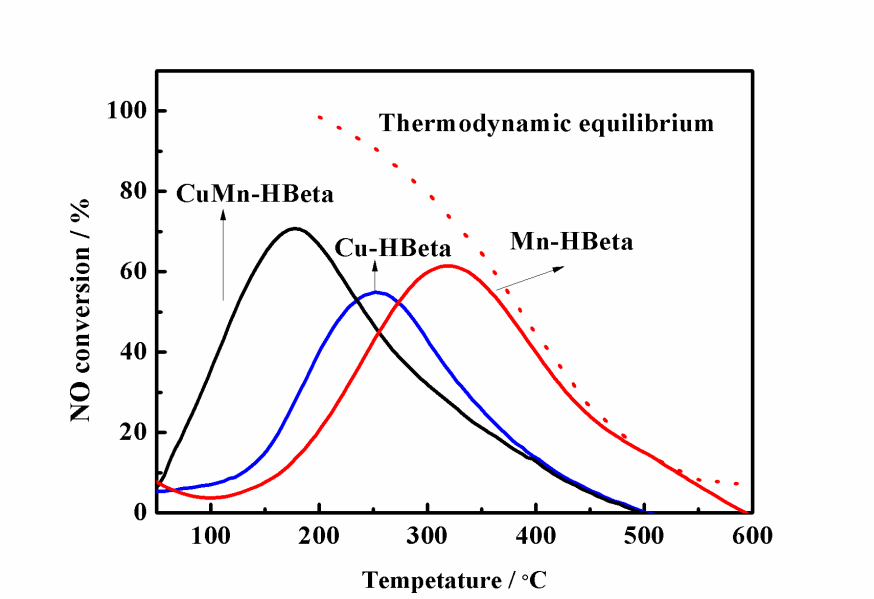

Figure S8. The oxidation activity of NO to NO_2 by O_2 over the sample CuMn-HBeta and the references Cu-HBeta and Mn-HBeta.