Supporting Information for

Three-dimensionally ordered macroporous SiO₂-supported transition metal oxide catalysts: Facile synthesis and high catalytic activity for diesel soot combustion

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XRD results of 3DOM SiO₂-supported transition metal catalysts

Figure 1b indicates that MnO₄/SiO₂ is composed of two mixed phases of Mn₂O₃ (PDF #41-1442) and Mn₃O₄ (PDF #24-0734). The feature peaks at 20 of 32.9°(222), 38.2°(400) and 28.8°(112), 59.8°(224) were belonged to Mn₂O₃ and Mn₃O₄, respectively (as " \blacktriangle " and " \bigtriangleup " marked in Figure 1b).¹ The diffraction peaks at 20 of 24.1°(012), 33.1°(104), 35.6°(110), 49.4°(024) and 54. 1°(116) are assigned to Fe₂O₃ in Figure 1c (marked by " \backsim "), indicating that Fe₂O₃ formed from Fe(NO₃)₃ in the calcination process.² Similarly to Fe₂O₃/SiO₂, cobaltous oxide formed from the Co(NO₃)₂ after calcination. The diffraction peaks (as " \bigstar "marked in Figure 1d) at 20 of 31.1°(220), 36.8°(311), 44.8°(400), 59.3°(511) and 65.2°(440) are attributed to Co₃O₄(PDF #43-1003).³ The diffraction peaks, which are located at 20 of 37.2°(111), 43.2°(200), 62.8°(220) and 75.4°(311) in Figure 1e (marked by " \bullet "), suggest that NiO formed when calcination process of Ni(NO₃)₂ was finished.⁴ Similarly, other transition metal nitrates, CuO also formed after calcination. The patterns in Figure 1f (marked by " \square ") are in good agreement with the standard diffraction peaks of CuO.⁵

References

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Table S1 the composition of surface and bulk over as-prepared catalysts

Sample	^a Surface composition/M:O:Si	^b bulk composition/M:O:Si
MnO _x /SiO ₂	3.55:68.08:28.37	1:(9.25-9.5):4
Fe ₂ O ₃ /SiO ₂	3.22:68.36:28.42	1:9.5:4
Co ₃ O ₄ /SiO ₂	2.59: 67.83:29.58	1:9.25:4
NiO/SiO ₂	3.26:68.12:28.62	1:9:4
CuO/SiO ₂	1.27:68.34:30.39	1:9:4

M:O:Si means mole ratio of transition metal, oxygen and silicon element

a: calculated by XPS results

b: calculated by the raw materials

 Table S2 Catalytic activity of 3DOM MnO_x/SiO₂ catalysts for soot combustion under different reaction conditions

Catalysts	^a Reaction conditions	T_{10} /°C	T ₅₀ /°C	T ₉₀ /°C	Sco ₂ ^{m/%}
Pure soot	2000 ppm NO, 10%O ₂	482	564	609	71.6
MnO _x /SiO ₂	2000 ppm NO, 10%O ₂	297	355	393	95.5
MnO _x /SiO ₂	200 ppm NO, 10%O ₂	315	404	450	94.9
MnO _x /SiO ₂	0 ppm NO, 10%O ₂	392	476	511	95.1

a: The total gas flow is 50mL/min and Ar is balance gas.



Figure S1 The CO₂ concentration profiles for soot combustion over 3DOM SiO₂-supported transition metal catalysts (A: different transition metal, B: different molar ratio of Mn to Si)