

Supporting Information

**Highly dispersed MnO_x-FeO_x supported by silicalite-1 for the Selective Catalytic Reduction of NO_x
with NH₃ at low temperatures**

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Table S1 Detailed consumptions of raw materials

Table S2 Detailed deconvolution parameters of Mn 2p and Fe 2p in different catalysts

Fig. S1 XRD patterns of MnO_x-FeO_x-loaded catalysts

Fig. S2 N₂ adsorption isotherms and corresponding pore size distribution of Silicalite-1.

(a) Microporous range; (b) Mesoporous range

Fig. S3 N₂ adsorption isotherms and corresponding pore size distribution of MnO_x-FeO_x-loaded catalysts.

(a) MnO_x/Silicalite-1; (b) MnO_x-(0.2) FeO_x/Silicalite-1; (c) MnO_x-(0.4) FeO_x/Silicalite-1;

(d) MnO_x-(0.6) FeO_x/Silicalite-1; (e) MnO_x-(0.8) FeO_x/Silicalite-1; (f) FeO_x/Silicalite-1

Table S1 Detailed consumptions of raw materials

Samples	Mn (NO ₃) ₂ , 50 wt% aqueous solution/g	Fe (NO ₃) ₃ ·9H ₂ O, 99.9%, powder/g	Silicalite-1, powder/g	Mass ratios of Fe/(Mn+Fe)
MnO _x /Silicalite-1	0.3254	0	1.00	0
MnO _x -(0.2) FeO _x /Silicalite-1	0.2603	0.0721	1.00	0.2
MnO _x -(0.4) FeO _x /Silicalite-1	0.1952	0.1443	1.00	0.4
MnO _x -(0.6) FeO _x /Silicalite-1	0.1301	0.2164	1.00	0.6
MnO _x -(0.8) FeO _x /Silicalite-1	0.0651	0.2886	1.00	0.8
FeO _x /Silicalite-1	0	0.3607	1.00	1.0

Table S2 Detailed deconvolution parameters of Mn 2p and Fe 2p in different catalysts.

Samples	Mn 2p _{3/2} (eV)*			Fe 2p _{3/2} (eV)#	
	Mn ²⁺	Mn ³⁺	Mn ⁴⁺	Fe ²⁺	Fe ³⁺
MnO _x /Silicalite-1	641.91	643.00	645.50	—	—
MnO _x -(0.2) FeO _x /Silicalite-1	641.49	642.85	645.50	711.00	713.00
MnO _x -(0.4) FeO _x /Silicalite-1	641.28	642.46	644.61	710.75	713.00
MnO _x -(0.6) FeO _x /Silicalite-1	641.20	642.48	644.97	710.74	713.00
MnO _x -(0.8) FeO _x /Silicalite-1	641.68	642.52	646	710.73	712.72
FeO _x /Silicalite-1	—	—	—	710.84	712.69

* $\Delta E = 11.4$ eV for Mn 2p_{3/2} and Mn 2p_{1/2}

$\Delta E = 13.6$ eV for Fe 2p_{3/2} and Fe 2p_{1/2}

ΔE stands for the binding energy gap for 2p_{1/2} and 2p_{3/2}

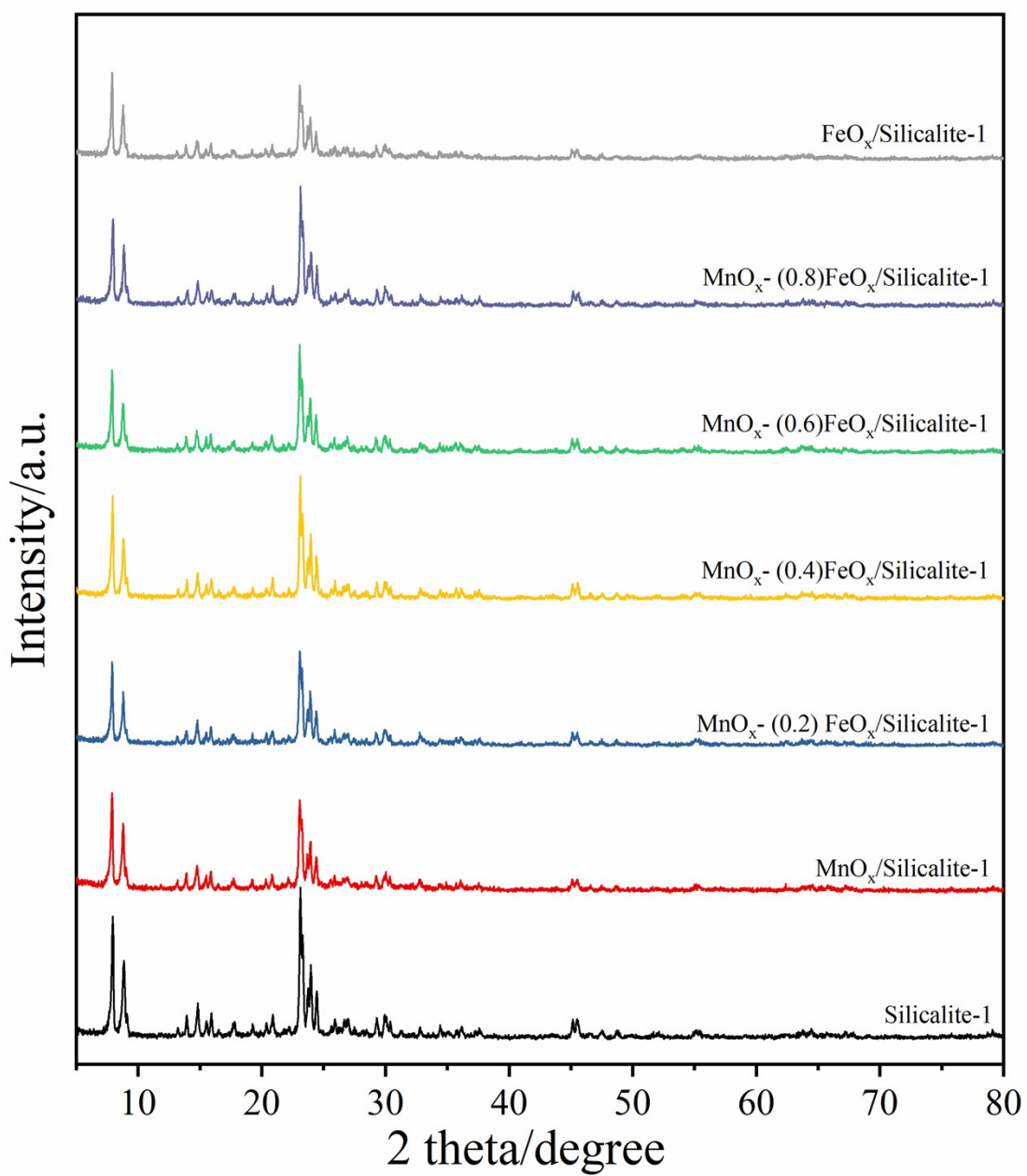


Fig. S1 XRD patterns of MnO_x-FeO_x-loaded catalysts

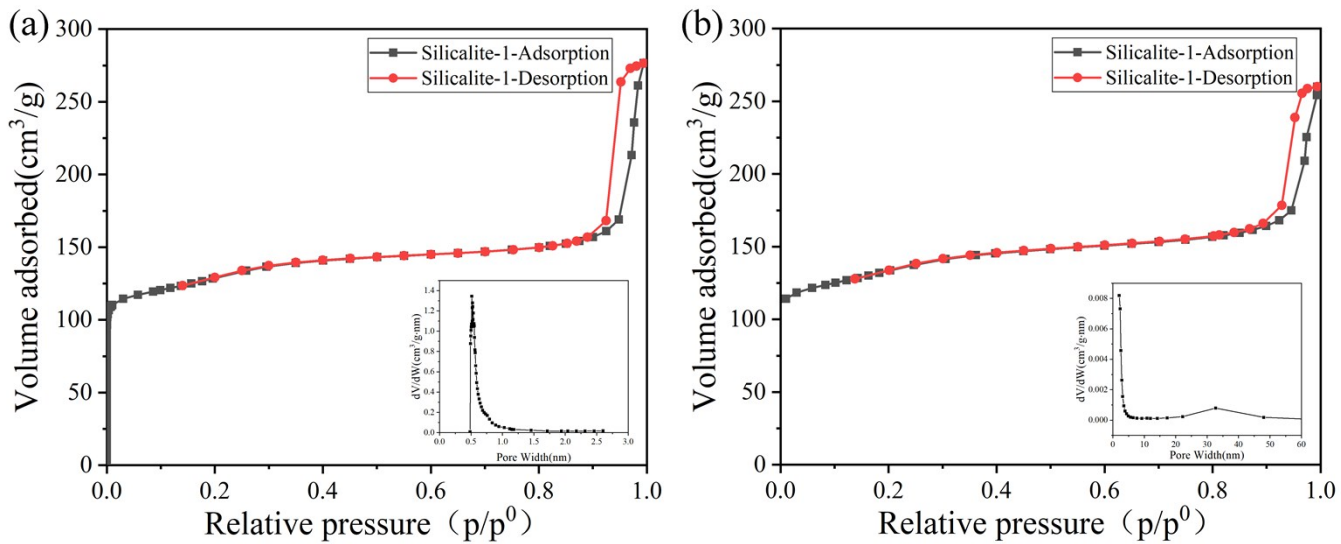


Fig. S2 N₂ adsorption isotherms and corresponding pore size distribution of Silicalite-1.

(a) Microporous range; (b) Mesoporous range

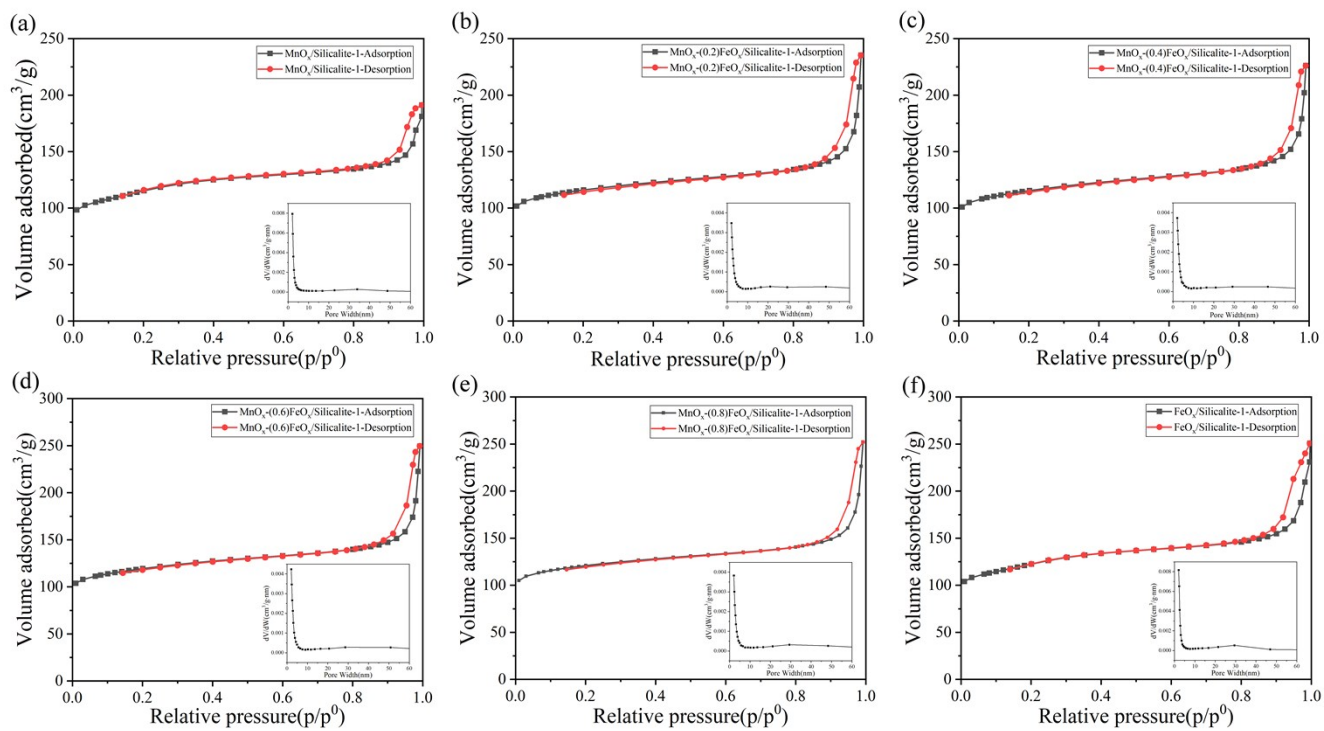


Fig. S3 N₂ adsorption isotherms and corresponding pore size distribution of MnO_x-FeO_x-loaded catalysts.

(a) MnO_x/Silicalite-1; (b) MnO_x-(0.2) FeO_x/Silicalite-1; (c) MnO_x-(0.4) FeO_x/Silicalite-1;

(d) MnO_x-(0.6) FeO_x/Silicalite-1; (e) MnO_x-(0.8) FeO_x/Silicalite-1; (f) FeO_x/Silicalite-1