Supplementary Information for

"Three pathways to selective catalytic reduction of NO over Pt/Nb-AlMCM-41 under H_2 with excess O_2"

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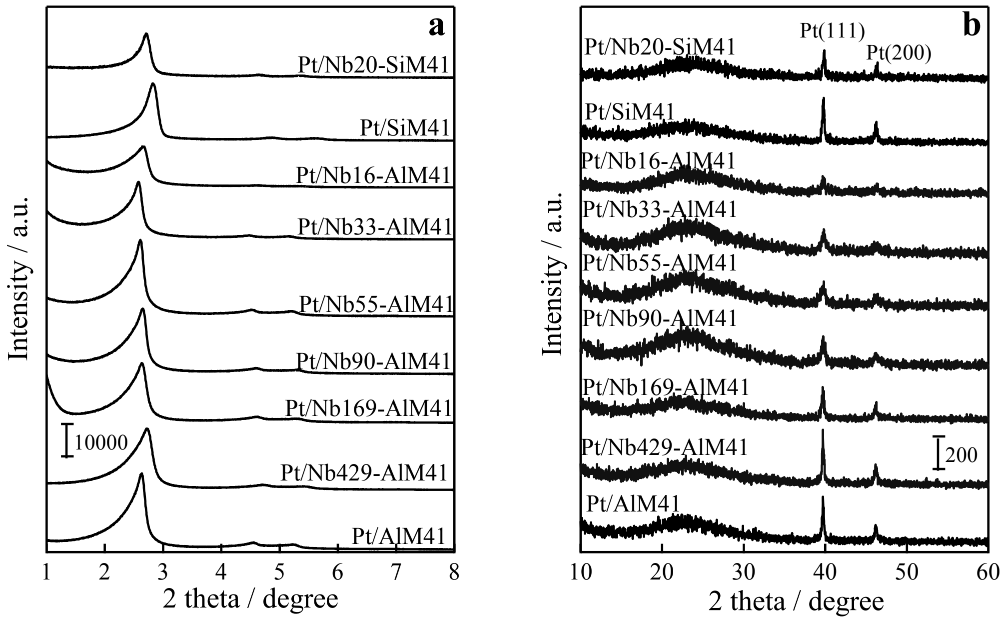

Fig. S1. XRD patterns of Pt/M41 and Pt/Nb-M41 of various Si/Nb ratios. The lower and higher angles are shown separately in (a) and (b).

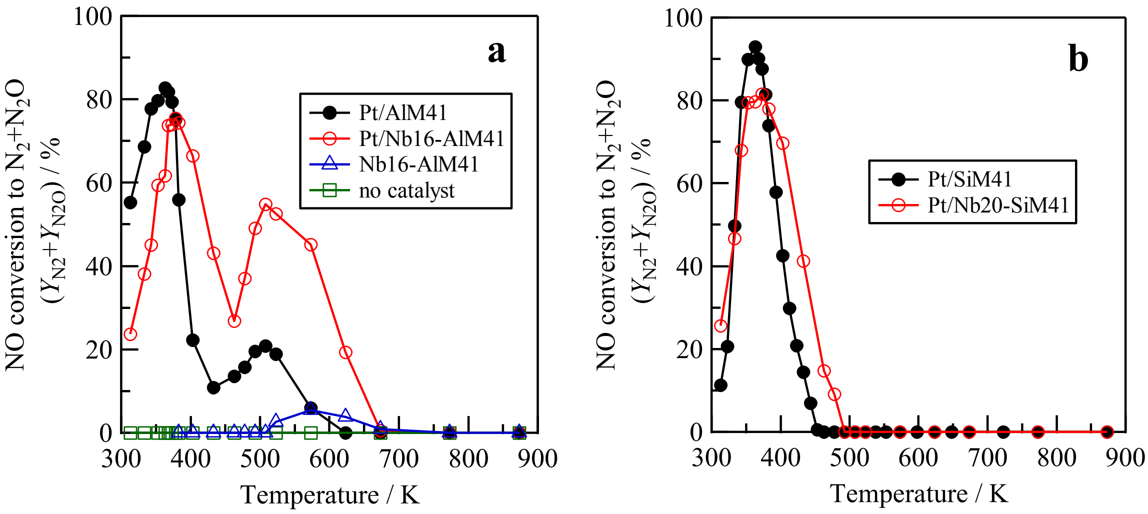

Fig. S2 Effect of Nb on the catalytic activity of (a) Pt/AlM41 and (b) Pt/SiM41 for H_2-SCR reaction. Feed gas was a mixture of 0.1% NO, 0.8% H_2, and 14% O_2 in He; total flow rate was 100 mL min^{-1} (GHSV 20,000 h^{-1}).

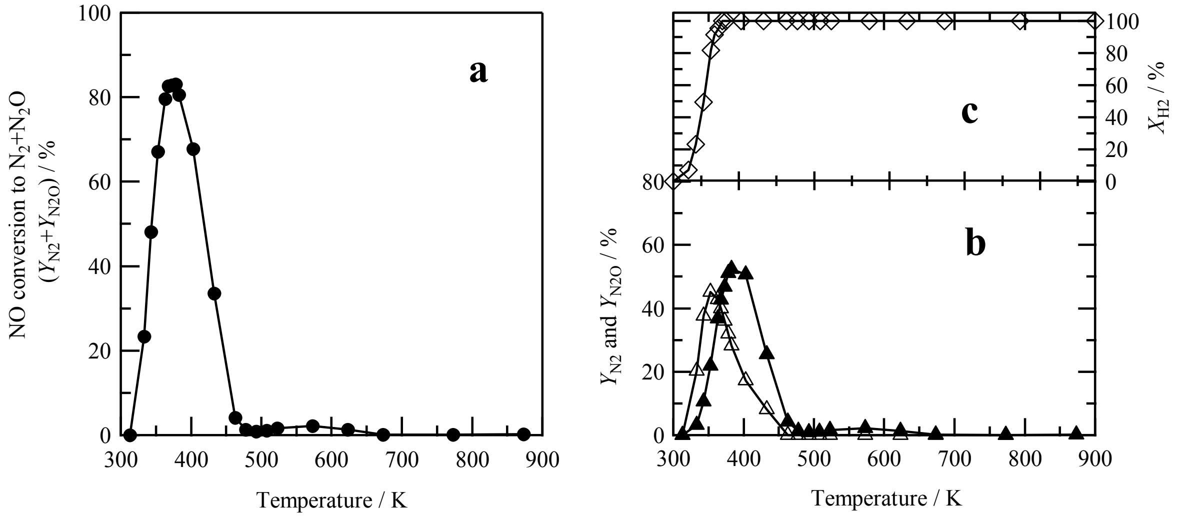

Fig. S3. Catalytic activity of Pt/3Nb/AlM41 prepared by impregnation for H_2-SCR: (a) NO conversion, (b) N_2 and N_2O yields, and (c) H_2 conversion. The amount of niobium loaded was 3 wt%. Symbols: closed circle, Y_{N2}+Y_{N2O}; closed triangle, Y_{N2}; open triangle, Y_{N2O}; open rhombus, X_{H2}. Reaction conditions are the same as in Fig. S2.

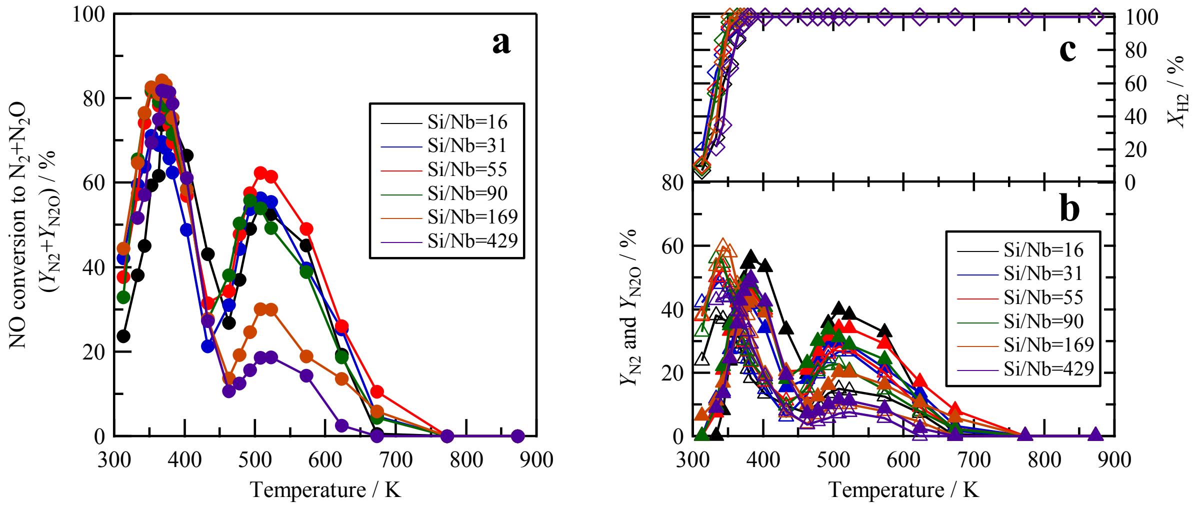

Fig. S4. Catalytic activity of Pt/Nb-AlM41s with Si/Nb ratios of 16-429 for H_2-SCR: (a) NO conversion, (b) N_2 and N_2O yields, and (c) H_2 conversion. Symbols: closed circle, Y_{N2}+Y_{N2O}; closed triangle, Y_{N2}; open triangle, Y_{N2O}; open rhombus, X_{H2}. Reaction conditions are the same as in Fig. S2.

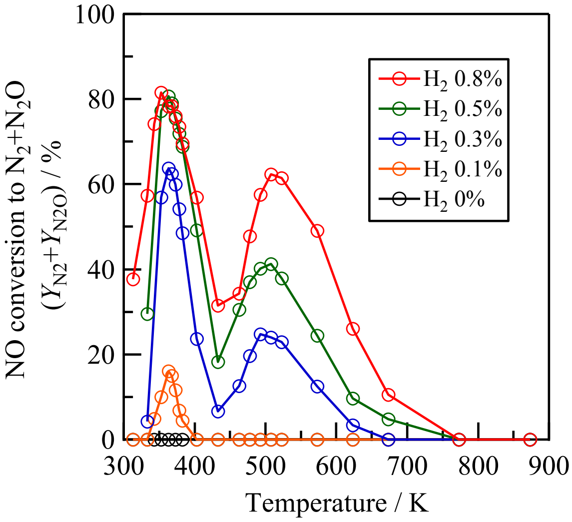

Fig. S5 Effect of partial pressure of H_2 on H_2-SCR over Pt/Nb55-AlM41. The reaction conditions are the same as in Fig. 1 except for partial pressure of H_2 (0-0.8%).

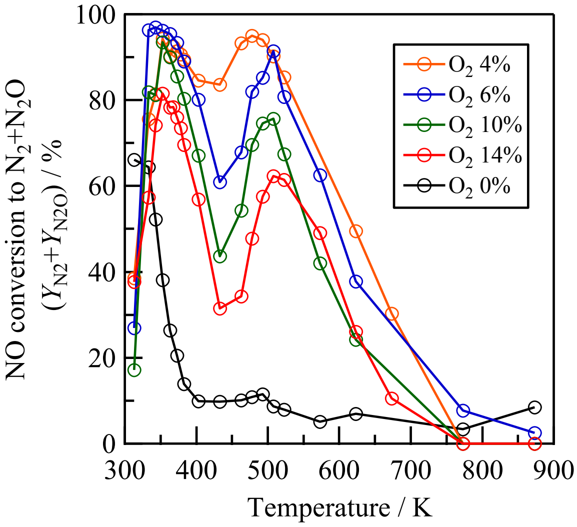

Fig. S6 Effect of partial pressure of O_2 on H_2-SCR over Pt/Nb55-AlM41. The reaction conditions are the same as in Fig. 1 except for partial pressure of O_2 (0-14%).

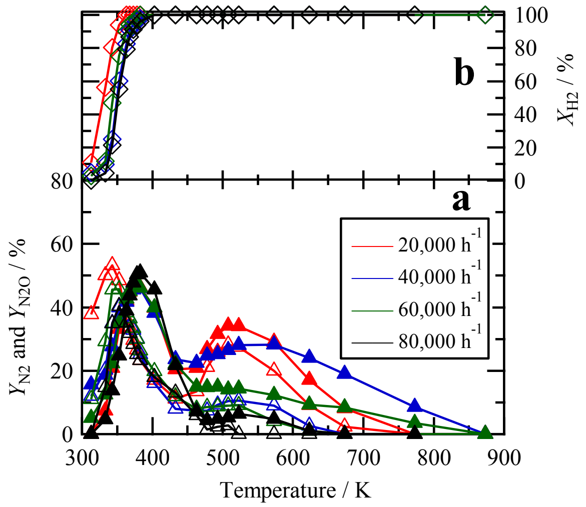

Fig. S7. Effect of GHSV on H_2-SCR over Pt/Nb55-AlM41: (a) N_2 and N_2O yields and (b) H_2 conversion. Symbols: closed triangle, Y_{N2}; open triangle, Y_{N2O}; open rhombus, X_{H2}. The reaction conditions are the same as in Fig. 1 except for GHSV (20,000-80,000 h^{-1}).

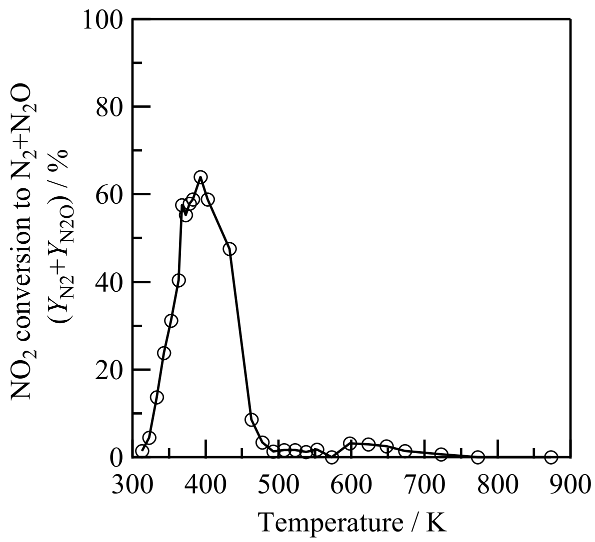

Fig. S8 NO_2-H_2-O_2 reaction over Pt/Nb55-AlM41. Feed gas was a mixture of 0.1% NO_2, 0.8% H_2, and 14% O_2 in He; total flow rate was 100 mL min^{-1} (GHSV 20,000 h^{-1}).

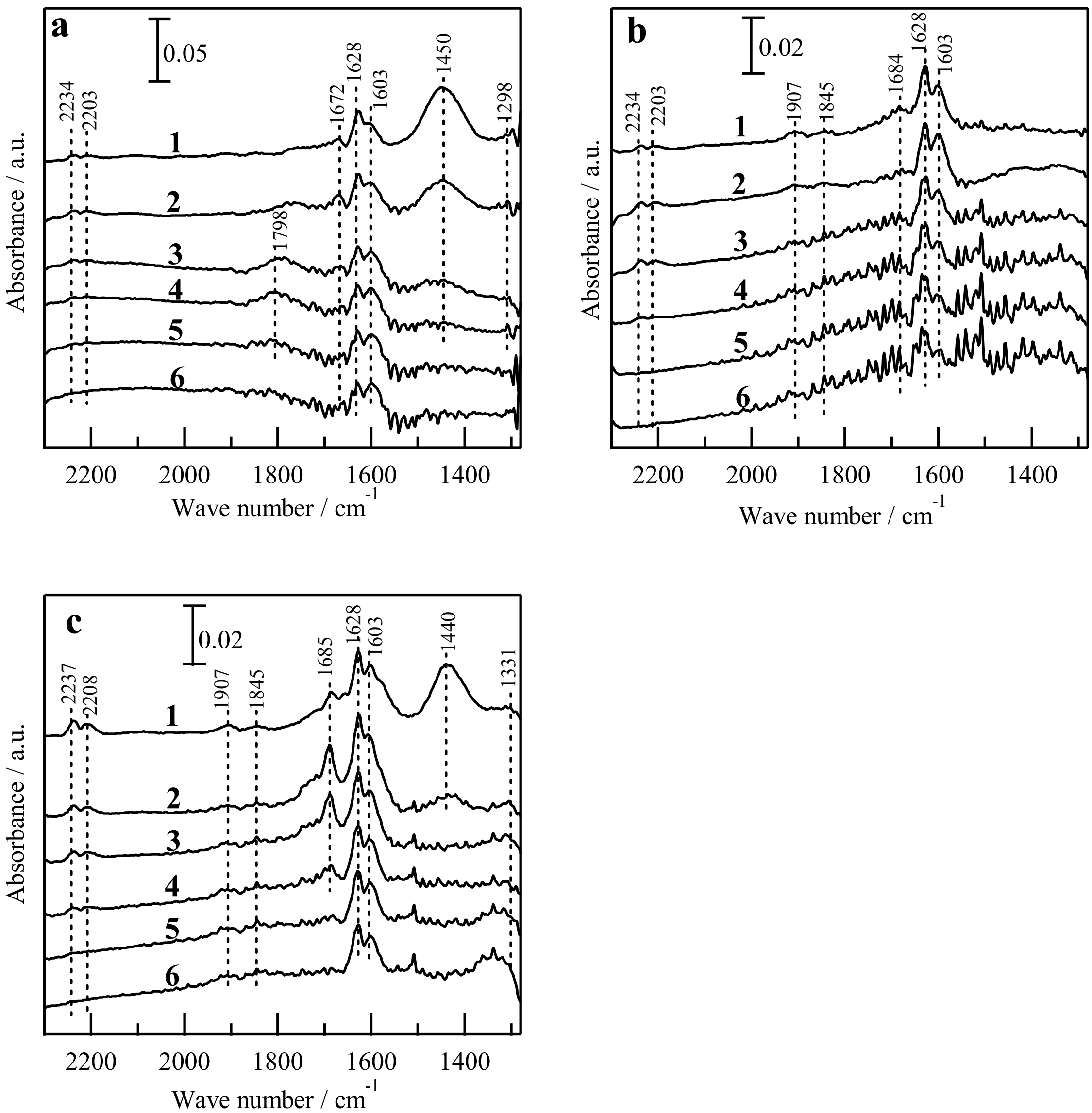

Fig. S9. In situ FT-IR spectra of adsorbed species on (a) Pt/AlM41, (b) Pt/SiM41, and (c) Pt/Nb20-SiM41 in the flow of reactant gases at (1) 373, (2) 403, (3) 433, (4) 463, (5) 493, and (6) 523 K. Feed gas was a mixture of 0.1% NO, 0.8% H_2, and 14% O_2 in He; total flow rate was 100 mL min^{-1}.