

## Electronic Supplementary Information

### Synthesis and characterization of Pt nanoparticles with different morphologies in mesoporous silica SBA-15 for methanol oxidation reaction

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Table S1 Total acidic capacity of SBA-15(-COOH) and Pt<sup>4+</sup>/SBA-15(-COOH)

Sample	Acidic Capacity (mmol of H <sup>+</sup> /g)
As-prepared SBA-15(-COOH)	1.04
Calcined SBA-15(-COOH) <sup>a</sup>	0.52
Pt <sup>4+</sup> impregnated on SBA-15(-COOH)	0.27
Calcined Pt <sup>4+</sup> /SBA-15(-COOH) <sup>b</sup>	0.25
Pt <sup>4+</sup> impregnated on calcined SBA-15(-COOH) <sup>c</sup>	0.19

<sup>a</sup>SBA-15(-COOH) was calcined at 673 K for 5 h; <sup>b</sup>Pt/SBA-15(-COOH) was calcined at 673 K for 5 h; <sup>c</sup>Pt<sup>4+</sup> was impregnated on SBA-15(-COOH) undergoing calcination at 673 K for 5 h.

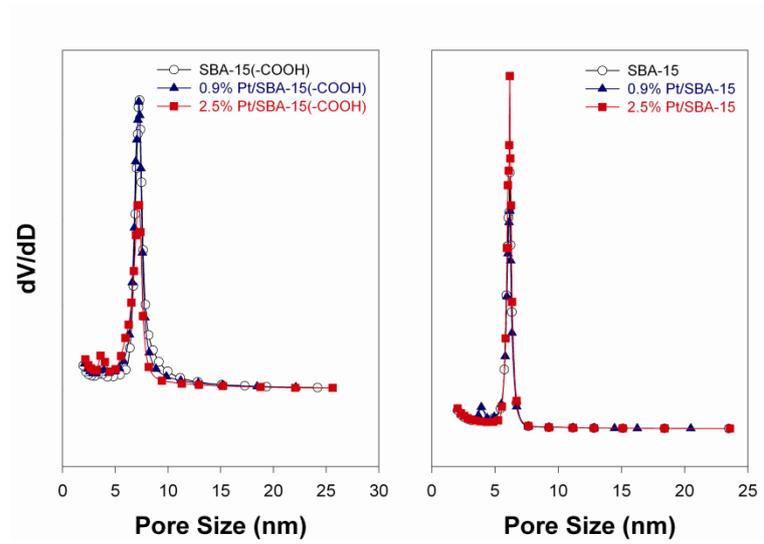


Figure S1 Pore size distributions of the samples shown in Figure 2

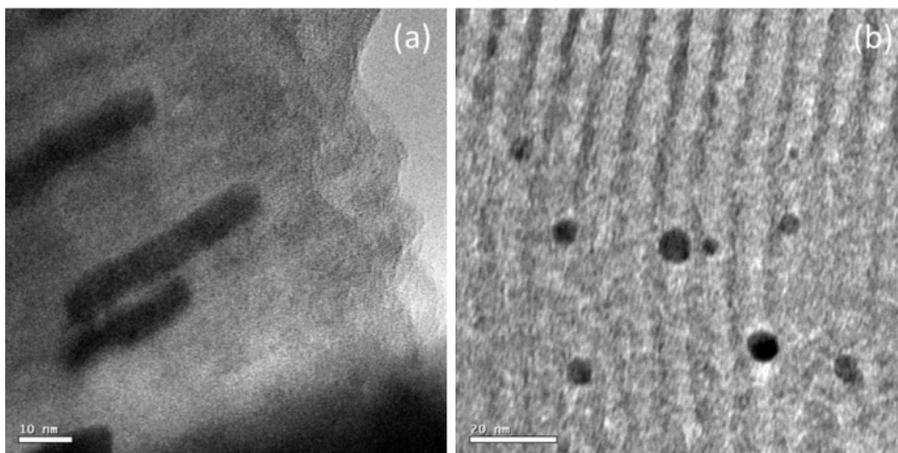


Figure S2 TEM images of calcined NPs: (a) 2.46% Pt on SBA-15 and (b) 2.52% on SBA-15(-COOH). All samples were calcined in air at 673 K for 5 h.

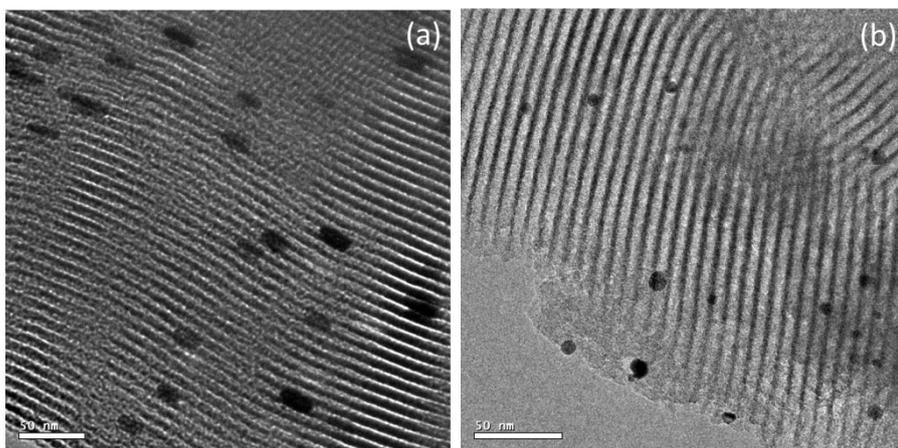


Figure S3 TEM images of reduced NPs: (a) 0.87 % Pt on SBA-15 and (b) 0.85% on SBA-15(-COOH).

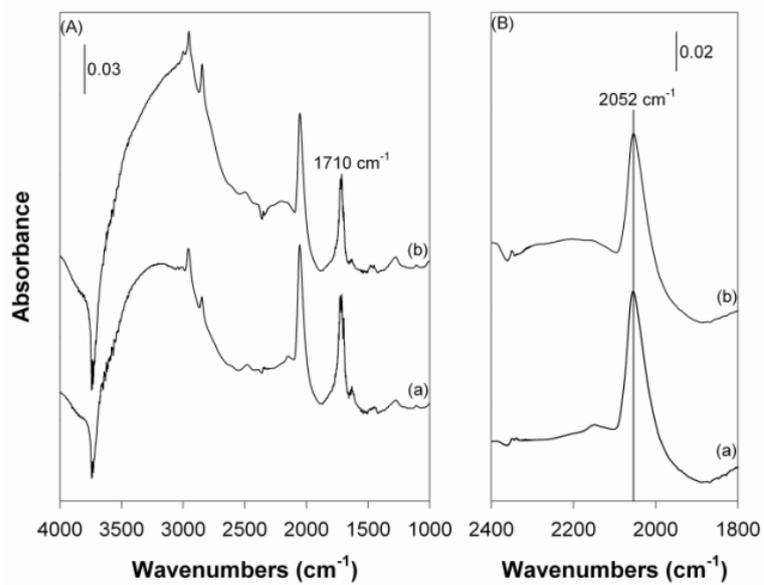


Fig. S4 Time dependence of the IR spectra for the co-adsorption of methanol and air onto 2.46% Pt/SBA-15 at 298 K for the (a) injection of 5  $\mu\text{L}$  of  $\text{CH}_3\text{OH}$  onto the catalyst for 5 min and (b) 30 mL/min airflow passed through the methanol pre-covered catalyst for 30 min.

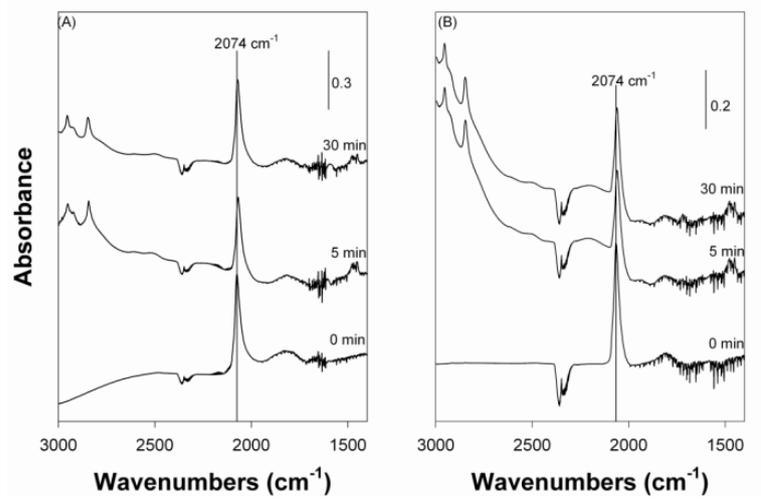


Fig. S5 Time-dependent IR spectra for a 5  $\mu\text{L}$  injection of  $\text{CH}_3\text{OH}$  onto pure CO pre-covered 2.46% Pt/SBA-15: (A) 20 min of CO exposure; (B) 30 s of CO exposure.

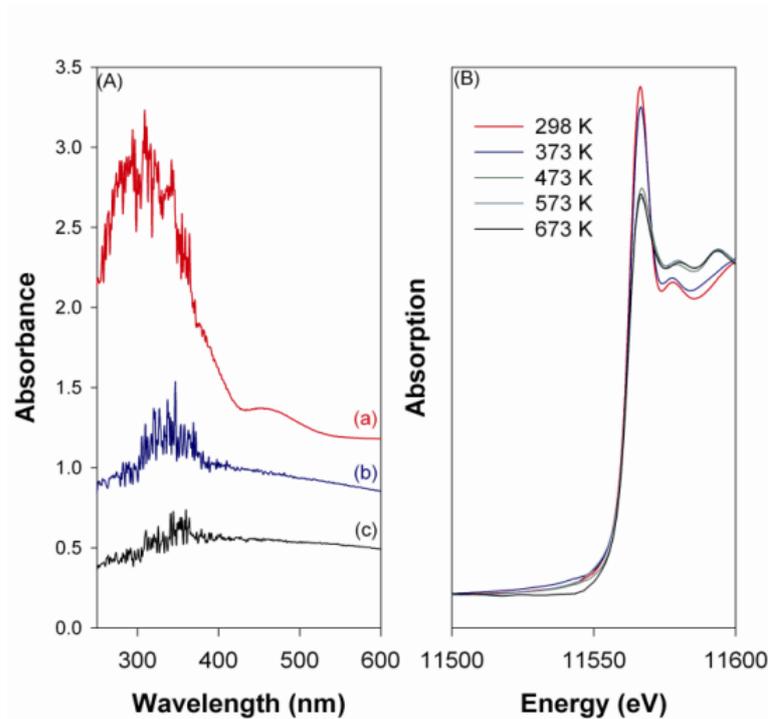


Figure S6 (A) UV-Vis diffuse reflectance spectra of (a) 2.5% Pt<sup>4+</sup>/SBA-15, (b) 2.5% Pt<sup>4+</sup>/SBA-15 reduced by CO gas at 673 K for 30 min, (c) 2.5% Pt/SBA-15 calcined in air and reduced in H<sub>2</sub> at 673 K for 5 h; (B) in situ Pt L-edge XANES spectra of Pt<sup>4+</sup>/SBA-15 in a 5% CO stream at different temperatures.