Supporting Information for

A Facile Route to Ordered Mesoporous Alumina Supported Catalysts and Their Catalytic Activities for CO Oxidation

Zhen-Xing Li, Fu-Bo Shi, Le-Le Li, Tao Zhang, and Chun-Hua Yan*

Beijing National Laboratory for Molecular Sciences, State Key Laboratory of Rare Earth Materials Chemistry and Applications & PKU-HKU Joint Laboratory in Rare Earth Materials and Bioinorganic Chemistry, Peking University, Beijing 100871, China

Synthesis of mesoporous alumina: 1.0 g of Pluronic P123 (Mav = 5800, $EO_{20}PO_{70}EO_{20}$) was dissolved in 20 mL of ethanol at room temperature (RT). Then 1.04g of citric acid and 2.04 g (10 mmol) of aluminum nitrate were added into the above solution with vigorous stirring. The mixture are covered with PE film, stirred at RT for about 5 h, and then put into a 40 °C drying oven to undergo the solvent evaporation process. After two days aging, calcination was carried out by slowly increasing temperature from RT to 400 °C (1 °C min^{-1} ramping rate) and heating at 400 °C for 4 h under air.

Mesoporous Alumina Supported Pt by the conventional impregnation method (CIM): 0.05 M chloroplatinic acid ($H_2PtCl_6 \cdot 6H_2O$) solution was added in distilled water containing mesoporous alumina powder under stirring. Then, a 0.5 M excess of $NaBH_4$ solution was used to initiate deposition of Pt nanoparticles. After stirring for 12 h, the solid was recovered by centrifugation, extensively washed with distilled water, and dried at 40 °C overnight. The product was then calcined in air at 300 °C for 2 h. The Pt content of catalyst was determined on an inductively coupled plasma-atomic emission spectrometer (ICP-AES).

Synthesis of mesoporous alumina supported Ag and Pd: A typical synthesis procedure, 1.0 g of Pluronic P123 (Mav = 5800, $EO_{20}PO_{70}EO_{20}$) was dissolved in 20 mL of ethanol at room temperature (RT). Then 1.04g of citric acid as reducing agent and acidity adjustment, 2.04 g (10 mmol) of aluminum nitrate, and a certain amount of Ag(acac) or $Pd(acac)_2$ was added into the above solution with vigorous stirring. The mixture are covered with PE film, stirred at RT for about 5 h, and then put into a 40 °C drying oven to undergo the solvent evaporation process. After two days aging, calcination was carried out by slowly increasing temperature from RT to 400 °C (1 °C min^{-1} ramping rate) and heating at 400 °C for 4 h under air. The Ag and Pd content of catalyst was determined on an inductively coupled plasma-atomic emission spectrometer (ICP-AES).

CO oxidization test: A home-made flow reactor system including a stainless steel reaction tube (1× 60 cm) was used for the catalytic test. In a typical CO oxidation experiment, 100 mg Pt/Al_2O_3 and 4 g quartz sand were mixed as catalyst, and the experiment was carried out under a flow of reactant gas mixture (1% CO, 20% O_2, balance He) at a rate of 50 $mLmin^{-1}$. Thecomposition of the gas was monitored on-line by gas chromatography (Agilent technologies, GC-7890A).

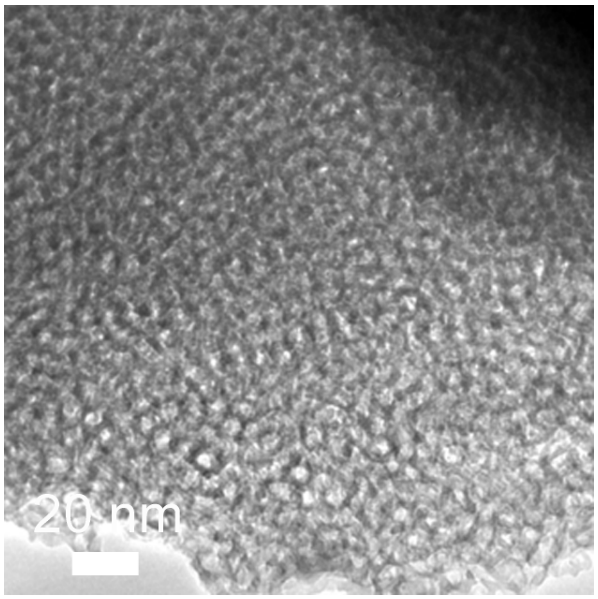

Fig. S1 TEM image of Pt supported on mesoporous alumina use H_2PtCl_6 as the Pt precursor.

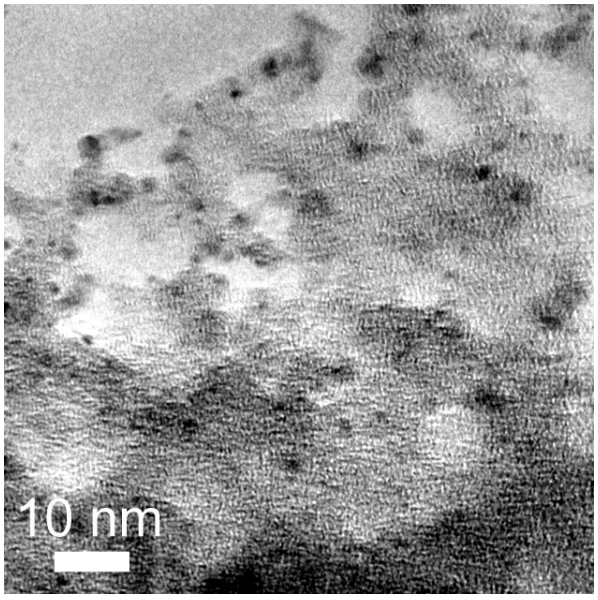

Fig. S2 TEM image of the sample prepared after thermal treatment at 40 °C.

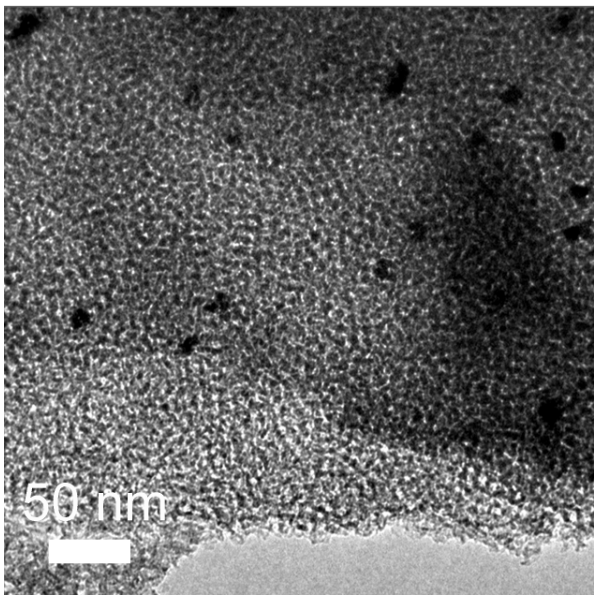

Fig. S3 TEM image of Pt supported on mesoporous alumina nitric acid instead of citric acid.

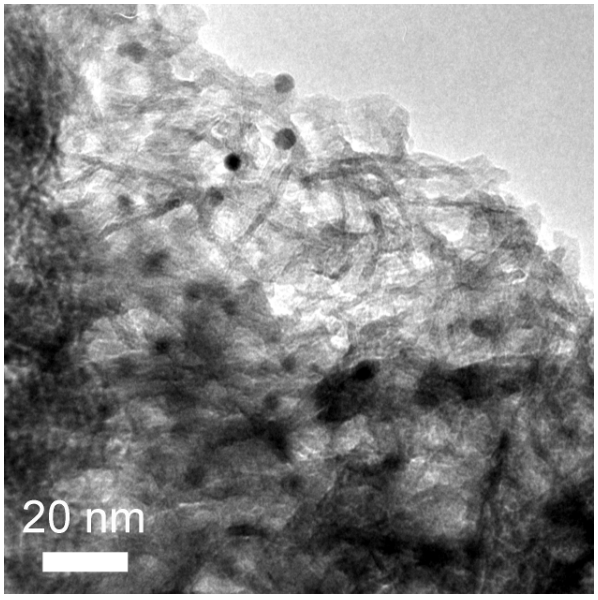

Fig. S4 TEM image of the Pt loaded on mesoporous mesoporous alumina by the conventional impregnation method (CIM).

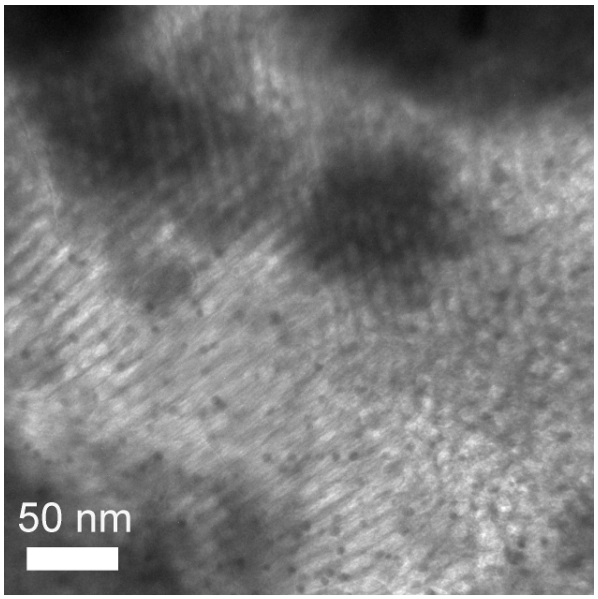

Fig. S5 TEM images of the 1.3 wt% Pt supported on mesoporous alumina calcination at 700 °C.

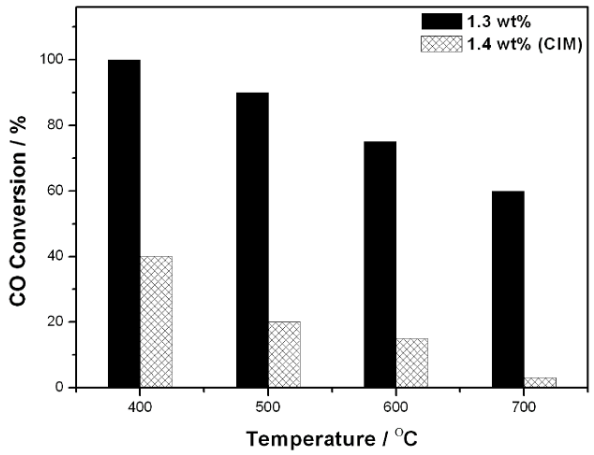

Fig. S6 CO conversion for the 1.3 wt% Pt supported on mesoporous alumina and the catalyst produced by the conventional impregnation method (CIM) at 140 °C after annealing at different temperatures.

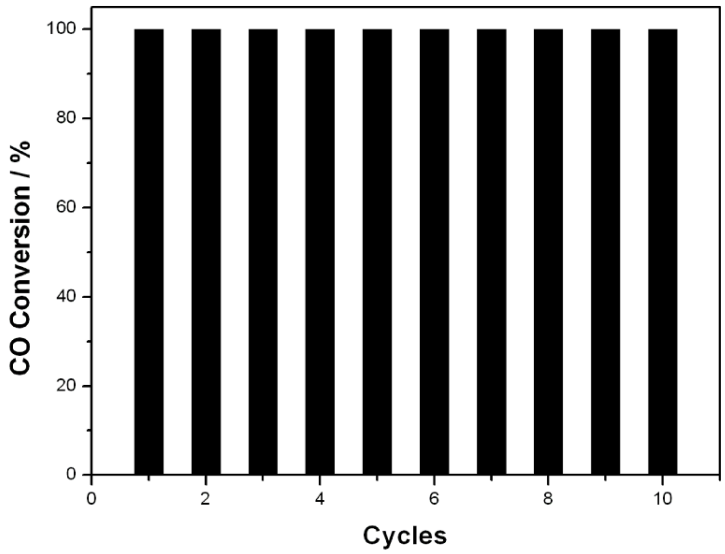

Fig. S7 Recycle catalytic reactions of the 1.3 wt% Pt supported on mesoporous alumina.

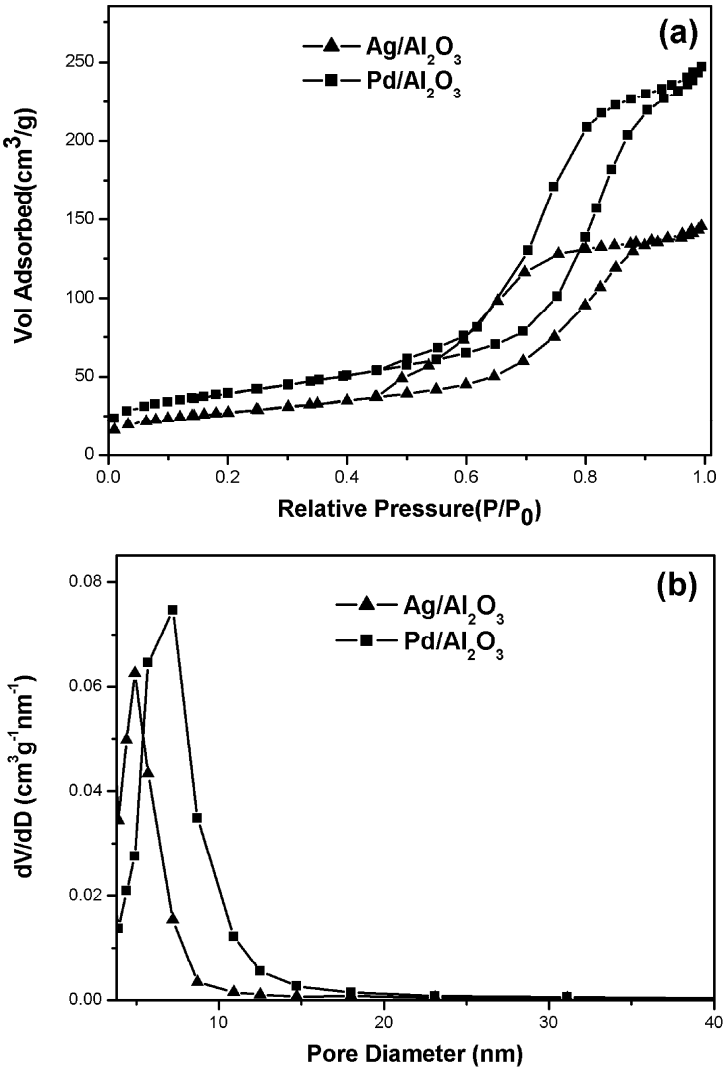

Fig. S8 (a) Nitrogen adsorption-desorption isotherms and (b) pore size distribution curves of the mesoporous alumina supported Ag and Pd.