

## Supporting Information for

### Novel Mesoporous Ag@SiO<sub>2</sub> Nanospheres as a Heterogeneous Catalyst with Superior Catalytic Performance for Hydrogenation of Aromatic Nitro Compounds

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#### Materials

Oleic acid, octadecylamine and all nitrobenzene derivatives were purchased from Sigma-Aldrich. Silver nitrate (AgNO<sub>3</sub>), tetraethyl orthosilicate (TEOS), cetyltrimethyl ammonium bromide (CTAB), ethanol (≥99.7%), chloroform were obtained from Sinopharm Chemical Reagent Co. Ltd.. All chemicals were of analytical grade without further purification.

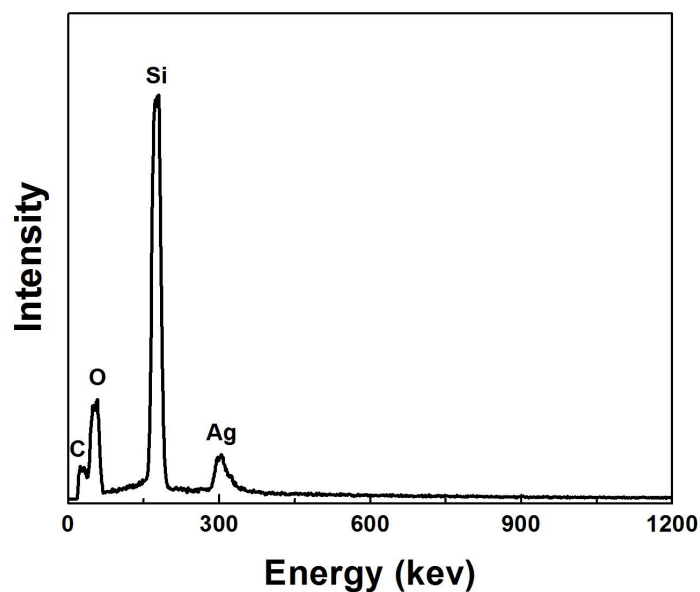
#### Hydrogenation of nitro compounds

The hydrogenation reaction was investigated in a 100 mL stainless steel autoclave with a Teflon tube to avoid metal contamination. For a typical reaction, 0.5 g substrate was placed into the autoclave, in which 30 mL ethanol containing 0.05 g of catalyst was poured. *O*-xylene was always used as internal standard for the posterior determination of conversion level and yields. After sealing the autoclave was purged by hydrogen for three times to remove the air and was pressurized at 2.0 MPa of hydrogen, and then heated up to 120 °C for 3 hrs. During the experiment, the stirring rate was fixed at 500 *r.p.m* (mechanical stirring). At the end of the reaction, the

autoclave was cooled to the ambient temperature and flushed two times with nitrogen. The catalyst was separated by centrifugation at 10000 *r.p.m.*, washed with ethanol for several times and reused in the next reaction. The combined organic phase was dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and evaporated under reduced pressure. The identification of the products and intermediates was done on a GCMS-QP2010 (SHIMADZU) spectrometer equipped with a DB-ms capillary column comparing with authentic samples. The <sup>1</sup>H NMR (300MHz, CDCl<sub>3</sub>) of aniline: δ = 7.12 (m, 2H), 6.80 (m, H) , 6.60 (m, 2H), 3.65 (m, 2H). The 0.5 g substrate corresponds 4.1 mmol for entry 1, 3.2 mmol for entry 2-4, 3.6 mmol for entry 5-10, 3.3 mmol for entry 11, 3.0 mmol for entry 12, 3.4 mmol for entry 13, 3.0 mmol for entry 14 in the Table 3, respectively.

### **Characterization of catalyst and products**

The morphologies of the catalyst were characterized by transmission electron microscopy (TEM) (Japan JEOL JEM-200CX, transition electron microscope). High-Resolution TEM (HRTEM) images were obtained on a Philips TECNAI F-30 FEG instrument at an accelerating voltage of 300 kV. SEM images and the energy dispersive spectrum (EDS) were obtained by a JEOL S-4800 apparatus. The phase purity of the products were characterized by X-ray power diffraction (XRD), (Shimadzu XD-3A X-ray diffractometer with Cu K $\alpha$  radiation,  $\lambda$ = 0.15417 nm). The BET (Brunauer-Emmett-Teller) surface area was measured by ASAP2020 (Micromeritics, United States). The purified products were analyzed by GCMS-QP2010 (SHIMADZU) equipped with DB-ms capillary column.



**Fig. S1** EDS image of A-MSS

**Table S1** Hydrogenation of nitrobenzene on the recycle A-MSS catalyst<sup>a</sup>

Entry	Cycle	Conversion (%)
1	1	100
2	2	100
3	3	100
4	4	100
5	5	100

<sup>a</sup> Reaction conditions: 0.05 g catalyst, 0.5 g substrate and 30 mL ethanol, H<sub>2</sub> pressure 2.0 MPa.

**Table S2** Hydrogenation of nitrobenzene on the different catalyst<sup>a</sup>

Entry	Catalyst		Conversion (%)	Selectivity (%)
1	A-MSS		100, 99 <sup>b</sup>	100
2	Free Ag NPs		86, 65 <sup>b</sup>	100
3	Ag/SiO <sub>2</sub>		96, 88 <sup>b</sup>	100

<sup>a</sup> Reaction conditions: 0.05 g catalyst, 0.5 g substrate and 30 mL ethanol, H<sub>2</sub> pressure

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2.0 MPa, temperature 120 °C.

<sup>b</sup> Reuse for five times

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