

Supporting information

for

Robust Ultrafine Ruthenium Nanoparticles Enabled by Covalent Organic Gel Precursor for Selective Reduction of Nitrobenzene in Water.

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Experimental Section

General Information

All chemicals were commercially available and used without further purification. Powder X-ray diffraction (XRD) patterns were recorded in the range of $2\theta = 5-85^\circ$ on a desktop X-ray diffractometer (RIGAKU-Miniflex II) with Cu K α radiation ($\lambda = 1.5406 \text{ \AA}$). Nitrogen adsorption and desorption isotherms were measured at 77 K using a Micromeritics ASAP 2020 system. The samples were degassed at 120 °C for 10 h before the measurements. Surface areas were calculated from the adsorption data using Brunauer-Emmett-Teller (BET) methods. The pore size distribution curves were obtained from the adsorption branches using non-local density functional theory (NLDFT) method. Raman spectra were obtained using a Renishaw UV-1000 Photon Design spectrometer at 532 nm excitation focused through a 100 \times microscope objective for a total interrogation spot size of $\sim 1 \text{ }\mu\text{m}$. Field-emission scanning electron microscopy (SEM) was performed on a JEOL JSM-7500F operated at an accelerating voltage of 3.0 kV. Transmission electron microscope (TEM) images were obtained with a JEOL JEM-2010 instrument operated at 200 kV. X-ray photoelectron spectroscopy (XPS) measurements were performed on a Thermo ESCALAB 250 spectrometer, using non-monochromatic Al K α X-ray as the excitation source and choosing C 1s (284.6 eV) as the reference line. Inductively coupled plasma spectroscopy (ICP) was measured on Jobin Yvon Ultima2. Inductively coupled plasma spectroscopy (ICP) was measured on Jobin Yvon Ultima2. Gas chromatography (GC) was performed on a Shimadzu GC-2014 equipped with a

capillary column (RTX-5, 30 m×0.25 μm) using a flame ionization detector.

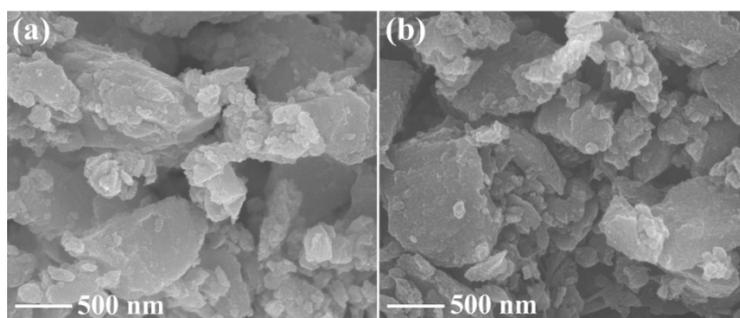


Figure S1 The SEM images for (a) Ru@NPC-1 and (b) Ru@NPC-2

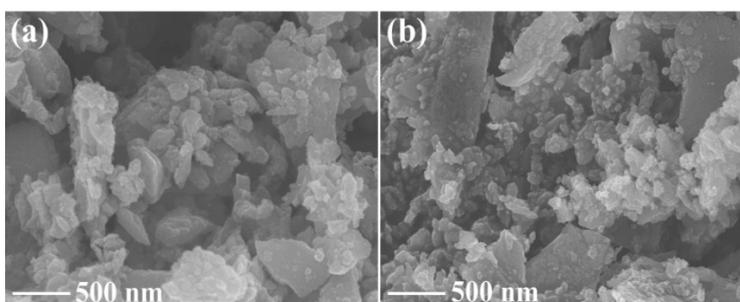


Figure S2. SEM images for (a) Ru@NPC-1-8run and (b) Ru@NPC-5run.

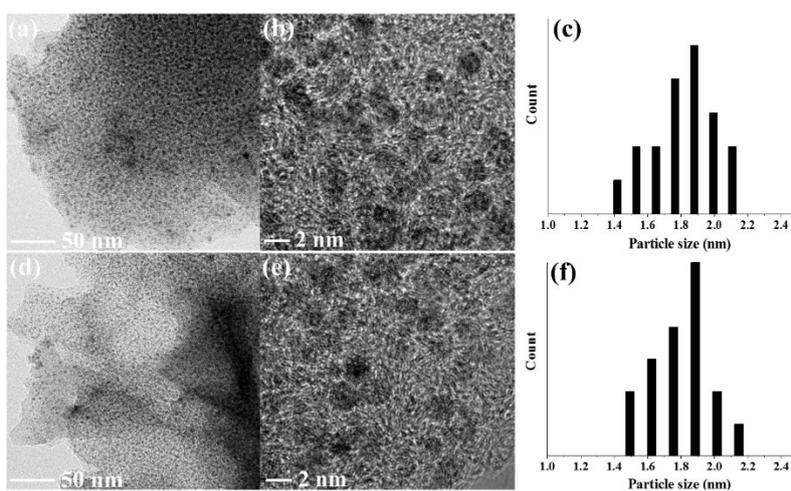


Figure S3. TEM images and size distribution of Pd@NPC (a, b, c) and Pt@NPC (d, e, f).