Supplementary Material (ESI) for Green Chemistry

Green Synthesis of 1-2 nm Gold Nanoparticles Stabilized by Amino-terminated Ionic Liquid and Their Electrocatalytic Activity in Oxygen Reduction

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SUPPORTING INFORMATION (SI)

1. Instrumentation

^{1}H NMR spectrum was obtained on a Varian Unity-400 (400 MHz) NMR spectrometer with tetramethylsilane (TMS) as an internal standard. DMSO was used as solvent.

The X-ray diffraction (XRD) pattern was collected on a D/Max 2500 V/PC X-ray diffractometer with high-intensity Cu Kα (40 KV, 200 mA) radiation.

X-ray photoelectron spectroscopy (XPS) analysis was carried out on an ESCALAB MK II X-ray photoelectron spectrometer.

The UV-visible absorbance spectra were acquired using a Cary 500 UV-visible NIR spectrometer (Varian).

TEM observations of the samples were performed on a Hitachi H-8100 microscope at 200 kV. TEM images were obtained using a Hitachi H-8100 microscope at 200 kV or (for high-

resolution imaging) a Tecnai F20 TEM.

Zeta potentials (ζ, effective surface charge) were measured by dynamic light scattering (Malvern Nano-ZS, U.K.).

Cyclic voltammetry (CV) scans were recorded using a CHI660 electrochemical workstation (Chenhua, Shanghai) equipped with a conventional three-electrode electrochemical cell, wherein the abovementioned functionalized glassy carbon (GC) electrodes served as the working electrodes in successive measurements. In all cases, a platinum wire and Ag/AgCl (sat. KCl) were the counter and reference electrodes, respectively.

2. Dialysis of Au-IL: Au-IL (20 mg) in 20 mL of water were transferred to a 15 kDa cutoff dialysis bag and dialyzed against 8×1 L of water with constant stirring at room temperature, six hours per repetition for a total of 48 h. Following dialysis, particles were isolated via centrifugation.

3. Results

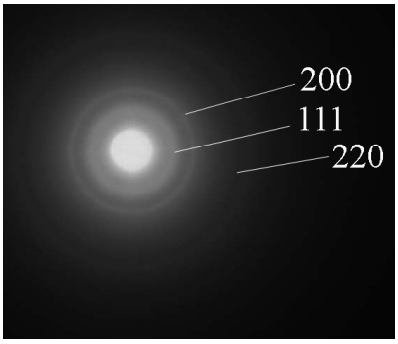

Figure S1 SAED pattern of gold nanoparticles prepared in the presence of IL-NH_2.

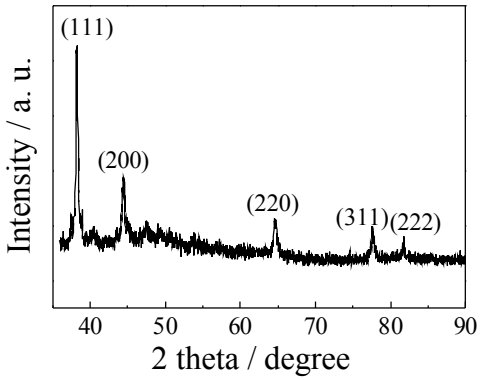

Figure S2 XRD pattern of gold nanoparticles prepared in the presence of IL-NH_2.

Figure S3 Molecular structure of $[C_4mim]^+BF_4^-$ in the control experiment.

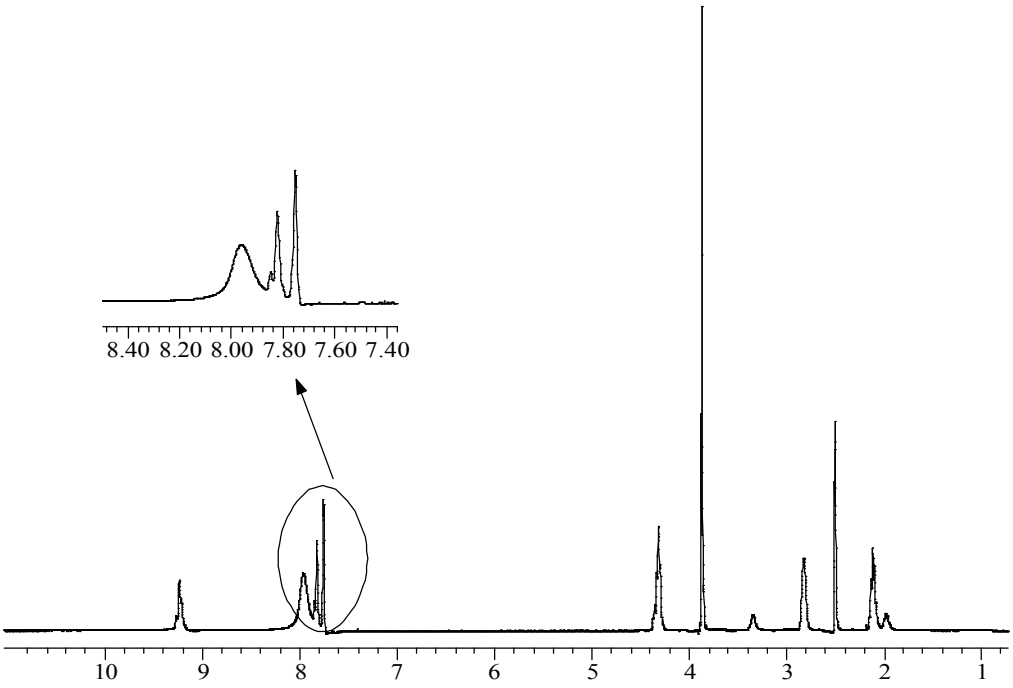

Figure S4 ^1H NMR spectrum of IL-NH_2. Inset indicated the presence of -NH_2.

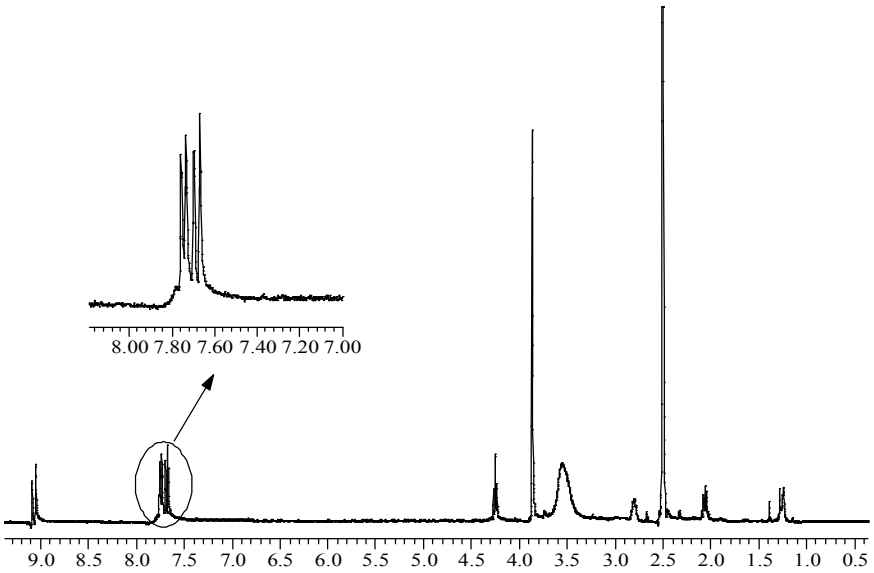

Figure S5 ^{1}H NMR spectrum of Au-IL. Inset indicated the -NH_2 disappeared after the reaction.

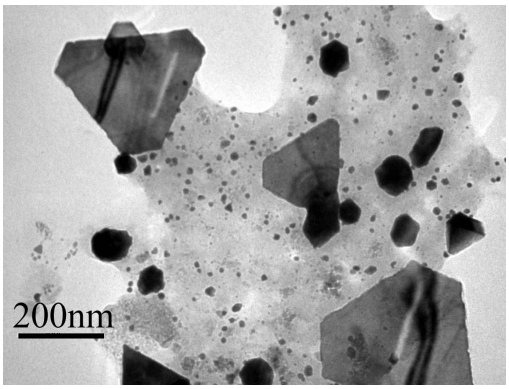

Figure S6 TEM image of Au-IL after the dialysis.

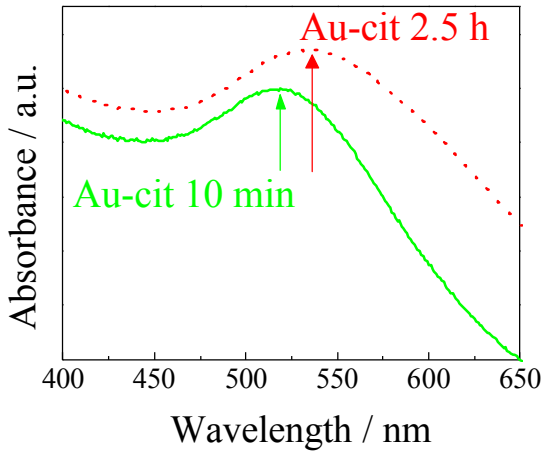

Figure S7 UV-vis spectra of Au-cit nanoparticles kept at room temperature over time.

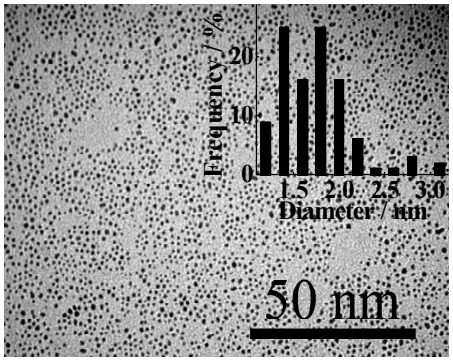

Figure S8 TEM image of Au-SH nanoparticles.