

## Supporting Information

### Kinetic Investigation for Catalytic Reduction of Nitrophenol using Ionic Liquid Stabilized Gold Nanoparticles

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#### Synthesis of Au@[C<sub>4</sub>,C<sub>16</sub>-im]Br nanoparticles:

Chemical and materials: *N*-butyl imidazole, 1-bromohexadecane, sodium borohydride (NaBH<sub>4</sub>) and Chloroauric acid (HAuCl<sub>4</sub>.3H<sub>2</sub>O) were purchased from Aldrich and were used as obtained. All the solvents used were of reagent grade and distilled prior to its use.

#### Synthesis of Ionic Liquids:

[C<sub>4</sub>C<sub>16</sub>Im]Br is synthesized according to the previously reported literature procedure. The synthesis of [C<sub>4</sub>C<sub>16</sub>Im]Br was carried in single step by quaternization reaction. The characterization and their purities were determined by NMR. The water content of the pure and dried imidazolium ionic liquids as measured by Karl Fischer coulometer analysis and did not exceed 50 ppm.

#### Synthesis of Au@[C<sub>4</sub>,C<sub>16</sub>-im]Br nanoparticles:

A solution of 10 mL of [C<sub>4</sub>C<sub>16</sub>Im]Br (50mmol) in deionised (DI) water was mixed with 10mL of HAuCl<sub>4</sub>.3H<sub>2</sub>O (5mmol) in DI water. A freshly prepared 10mL of NaBH<sub>4</sub> (50 mmol) in DI water was then added dropwise to the mixture under vigorous stirring. The colour of solution turned to red wine indicating the formation of AuNPs as shown in Figure SI 1. The AuNPs is purified by centrifugation method. The SPR band for Au@[C<sub>4</sub>C<sub>16</sub>Im]Br in DI water is displayed at  $\lambda_{SPR}$  of 521nm confirmed the formation of AuNPs. The Au@[C<sub>4</sub>C<sub>16</sub>Im]Br NPs are stable for over months.



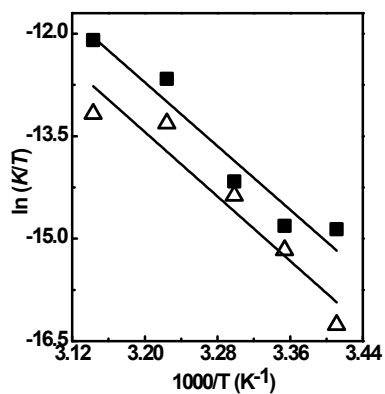
**Figure S1.** Au@[C<sub>4</sub>C<sub>16</sub>Im]Br NPs.

**Table S1.** The  $k_{app}$  values for reduction of 4-nitrophenol at different concentration of 4-nitrophenol with fixed concentration of Au@[C<sub>4</sub>C<sub>16</sub>Im]Br and NaBH<sub>4</sub> at 298.15 K.

S. No.	4-Nitrophenol (M) 10 <sup>-4</sup>	10 <sup>4</sup> $k_{app}$ (s <sup>-1</sup> )
1	0.2	3.88
2	0.5	1.10
3	0.9	7.21
4	1.3	0.18
5	1.7	0.05

**Table S2.** The  $k_{app}$  values for reduction of 4-nitrophenol at different conc. of NaBH<sub>4</sub> with fixed conc. of Au@[C<sub>4</sub>C<sub>16</sub>Im]Br and 4-nitrophenol at 298.15 K.

S. No.	NaBH <sub>4</sub> (10 <sup>-4</sup> M)	10 <sup>6</sup> $k_{app}$ (s <sup>-1</sup> )
1	0.1	4.43
2	0.3	4.58
3	0.6	6.35
4	0.9	22.0
5	1.2	24.3



**Figure S2.** The Eyring plots of  $\ln(k_{app}/T)$  vs  $1/T$  for the reduction reaction of 4-nitrophenol ( $\Delta$ ), 2-nitrophenol ( $\blacksquare$ ) with NaBH<sub>4</sub> at different temperature.