One-pot interfacial synthesis of Au nanoparticles and Au-polyaniline nanocomposites for catalytic applications

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Experimental

Interfacial polymerization. In a 20 ml vial, 1 ml of aniline (98%, Aldrich) was dissolved in 5 ml of CCl_4 (Aldrich) as the oil phase. 5 ml of H_2O were then added to the vial to form a water/ion interface. Then, the vial was placed in an ice-water bath. 15 minutes later, 5 ml of 10 mM $HAuCl_4$ (Aldrich) were added to the water phase to initiate the polymerization of aniline. After a controlled time, the water phase was transferred, and the aqueous solution (containing Au nanoparticles) and black powders (Au-PANI nanocomposites) were separated by centrifugation. The Au-PANI nanocomposites were washed with H_2O for sererval times and dispersed in 1 ml of H_2O for catalytic study. Note: As the amount of aniline used in the reaction is excessive as compared to the oxidant, $HAuCl_4$, the conversion rate of aniline is not calculated in our experiment.

Catalytic study. The reduction of rhodamine B (RhB) by $NaBH_4$ was chosen as the model system for studying the catalytic properties of Au-PANI nanocomposites. In the reaction, 1 ml of freshly prepared NaBH4 (0.5 M) was added to 20 ml of RhB aqueous solution (5×10^{-5} M). Then 0.5 ml of Au-PANI nanocomposte was added to the system. Variation of the RhB concentration was monitored by recording the absorptions at 554 nm in UV-Vis spectra.

Additional Figures:

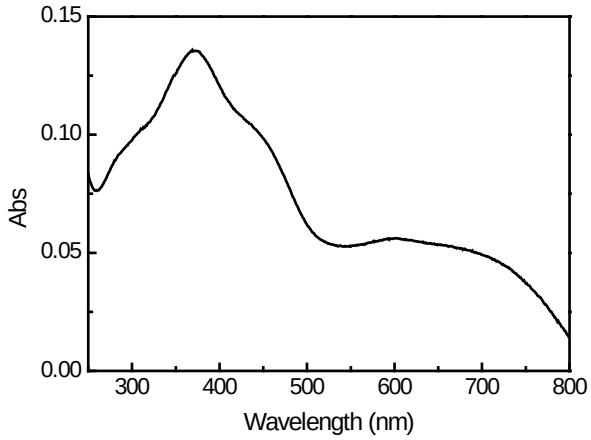

Fig. S1 UV-Vis absorption spectrum of Au-PANI nanocomposite at a reaction time of 1 h.

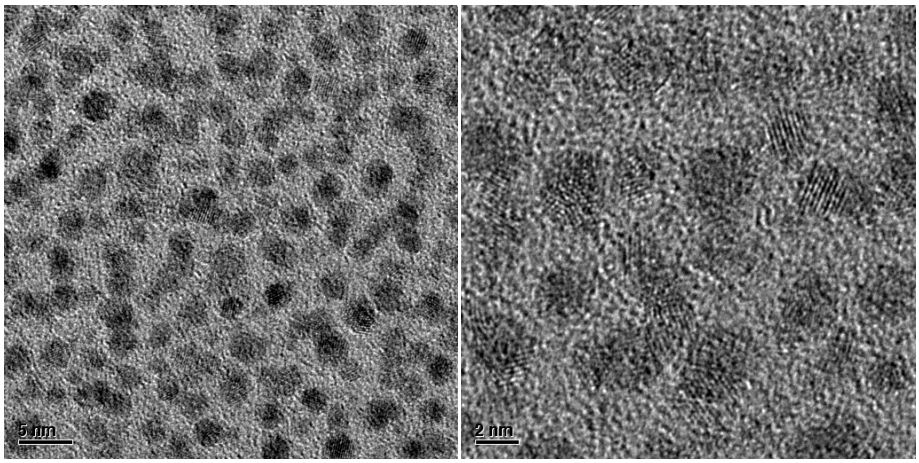

Fig. S2 TEM images of AuNPs taken from the supernatant of the water phase, at a reaction time of 1 h.

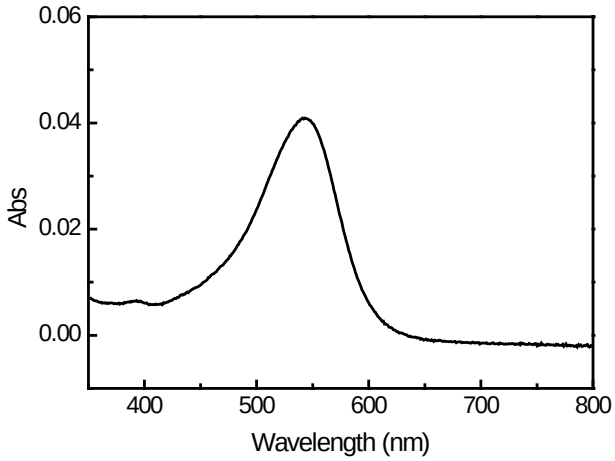

Fig. S3 UV-Vis absorption spectrum of AuNPs at a reaction time of 12 h.

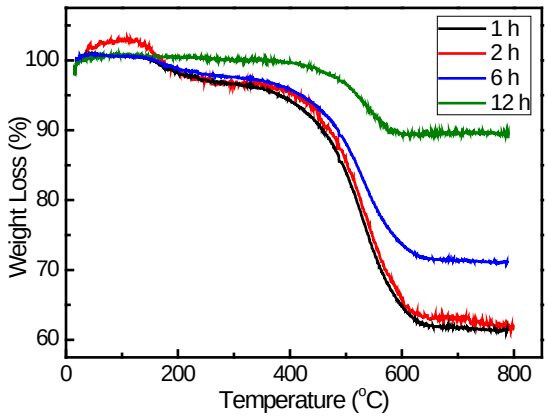

Fig. S4 Thermogravimetric curves of Au-PANI nanocomposites.

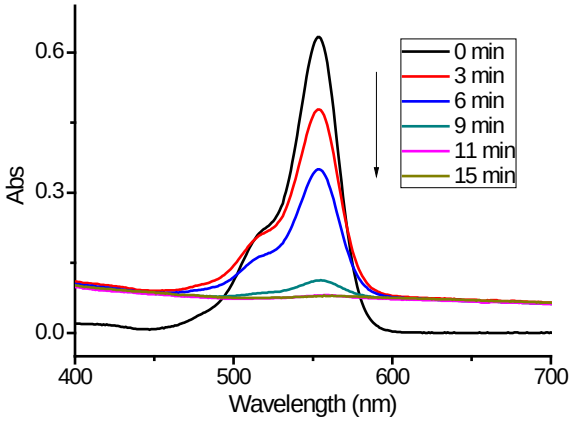

Fig. S5 UV-Vis absorption spectrum of the reduction of RhB by $NaBH_4$ in the presence of Au-PANI nanocomposite obtained at a reaction time of 12 h.