Detection of Single Metal Nanoparticle Collision Events in Non-Aqueous Media

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Supporting Information Abstract

Included in the supporting information are dynamic light scattering measurements showing the average size of the propanethiol-capped Au nanoparticles as-synthesized (S-1) and after 1 hour in the electrolyte used in the particle collision experiments (S-3). In addition, a "blank" experiment showing the background current of a Pt UME under identical conditions to that of the particle collision experiments is shown to confirm that no current steps are observable (S-2).



Figure S1: Dynamic light scattering measurement of propanethiol-capped Au nanoparticles in toluene. The average is taken from a total of 14 runs.



Figure S2: Chronoamperogram of 25 μ m Pt UME in 10 mM tripropylamine and 25 mM TBAPF₆ in the absence of Au nanoparticles. The counter electrode was a Pt rod and the quasi-reference electrode was a Pt wire. The potential applied was +0.35V (vs. Pt), the same as in the collision experiment.



Figure S3: Dynamic light scattering measurement of Au nanoparticles added to 10 mM TPrA and 25 mM TBAPF₆ in 2:1 toluene/acetonitrile (v/v) after 1 hour. The average size of the aggregated nanoparticles is 429.8 ± 31.21 nm. A total of 15 runs was used for the averaging.



Figure S4: Histogram of the current steps from Figure 5 deconvoluted to Gaussian curve fits. The best fit was obtained with 2 Gaussian curves centered at 2.57 pA and 5.69 pA. The blue trace is the sum of the two curves. Deconvolution and fitting was carried out using OriginPro 2017.



Figure S5: Histogram of the current steps from Figure 5 deconvoluted to lognormal curve fits. The best fit was obtained with 2 lognormal distributions centered at 2.53 pA and 5.69 pA. The blue trace is the sum of the two lognormal distributions. Deconvolution and fitting was carried out using OriginPro 2017.



Figure S6: TEM image of 5-6 month old propanethiol-capped Au nanoparticles. While aggregation of particles is clear, there are several particles that have diameters of 1-5 nm.





References:

1 V. Subramanian, E. E. Wolf and P. V. Kamat, *J Am Chem Soc*, 2004, **126**, 4943–4950.

2 Introduction to Gold Nanoparticle Characterization - Cytodiagnostics,

http://www.cytodiagnostics.com/store/pc/Introduction-to-Gold-Nanoparticle-Characterizationd3.htm, (accessed June 11, 2017).