Electrochemical Size Discrimination of Gold Nanoparticles Attached to Glass/Indium-Tin-Oxide Electrodes by Oxidation in Bromide-Containing Electrolyte

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Supporting Information

All Linear Sweep Voltammograms (LSVs) Obtained in This Study.

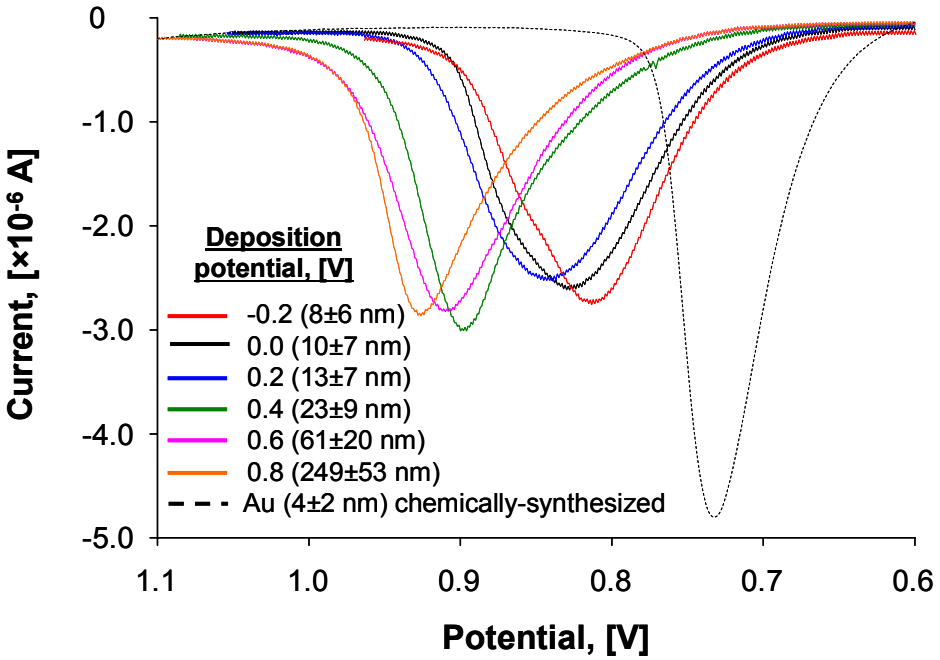

Figure S1. Linear sweep voltammograms obtained in 10 mM KBr plus 0.1 M $HClO_4$ solution of Glass/ITO electrodes containing electrochemically- and chemically-synthesized Au NPs on the surface as indicated.

Effect of Coverage on Oxidation Potential of Au NPs.

Figure S2 shows LSVs of Glass/ITO electrodes coated with different coverages of chemically-synthesized 4 nm average diameter Au NPs by immersion of the electrode into an Au NP solution for different amounts of time as indicated. Table S1 shows the corresponding data obtained from LSVs.

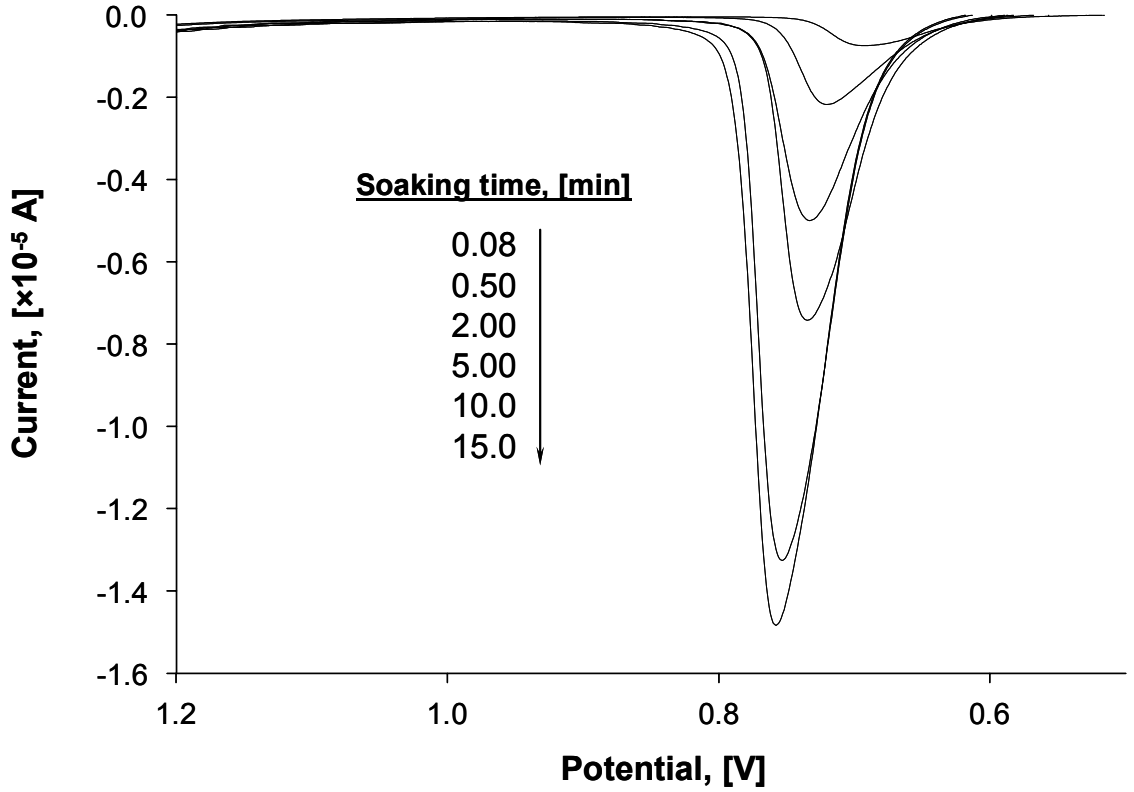

Figure S2. LSVs obtained in 10 mM KBr plus 0.1 M $HClO_4$ solution of Glass/ITO electrodes coated with 4 nm average diameter Au NPs by soaking in an Au NP solution for 0.08, 0.50, 2, 5, 10 and 15 min as indicated.

Table S1. Peak oxidation potential of 4 nm Au NPs as a function of coverage.

Soaking time, [min]	Coverage or Charge (Q) in coulombs (C)	ln (Q)	Peak Potential [mV]
0.08	6.235×10^{-5}	-9.68	692
0.5	16.81×10^{-5}	-8.69	720
2	35.17×10^{-5}	-7.95	734
5	49.59×10^{-5}	-7.61	735
10	86.57×10^{-5}	-7.05	753
15	98.75×10^{-5}	-6.92	758

Figure S3 shows a plot of peak potential versus ln(Au Coverage), or ln(Q). The linear relationship is indicative of an electrochemically reversible reaction.

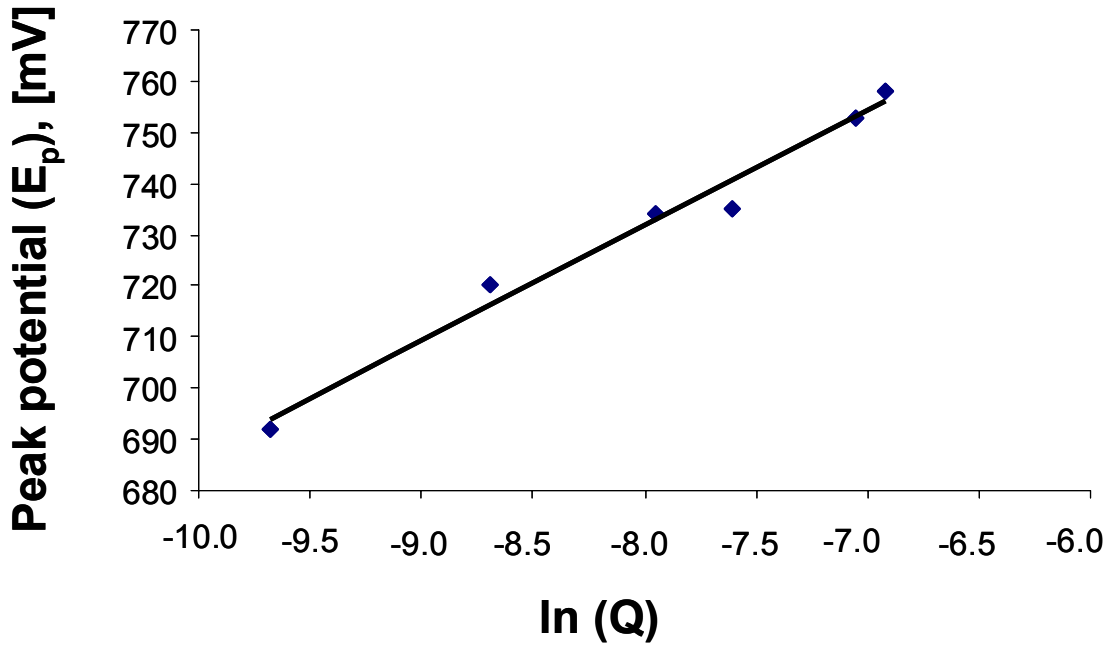

Figure S3. Plot of peak oxidation potential (E_p) in mV versus ln (Au Coverage), or ln (Q).

SEM Images of Glass/ITO/Au NPs Before and After Oxidation.

Figure S4 shows SEM images of Au NPs electrodeposited on Glass/ITO at 0.8 V before electrochemical oxidation (Frame A) and after oxidation (Frames B-D). The images show a mostly clean surface with only a few areas with deformed particles not fully-dissolved after oxidation. The circle in Frame B shows the area imaged in Frame D.

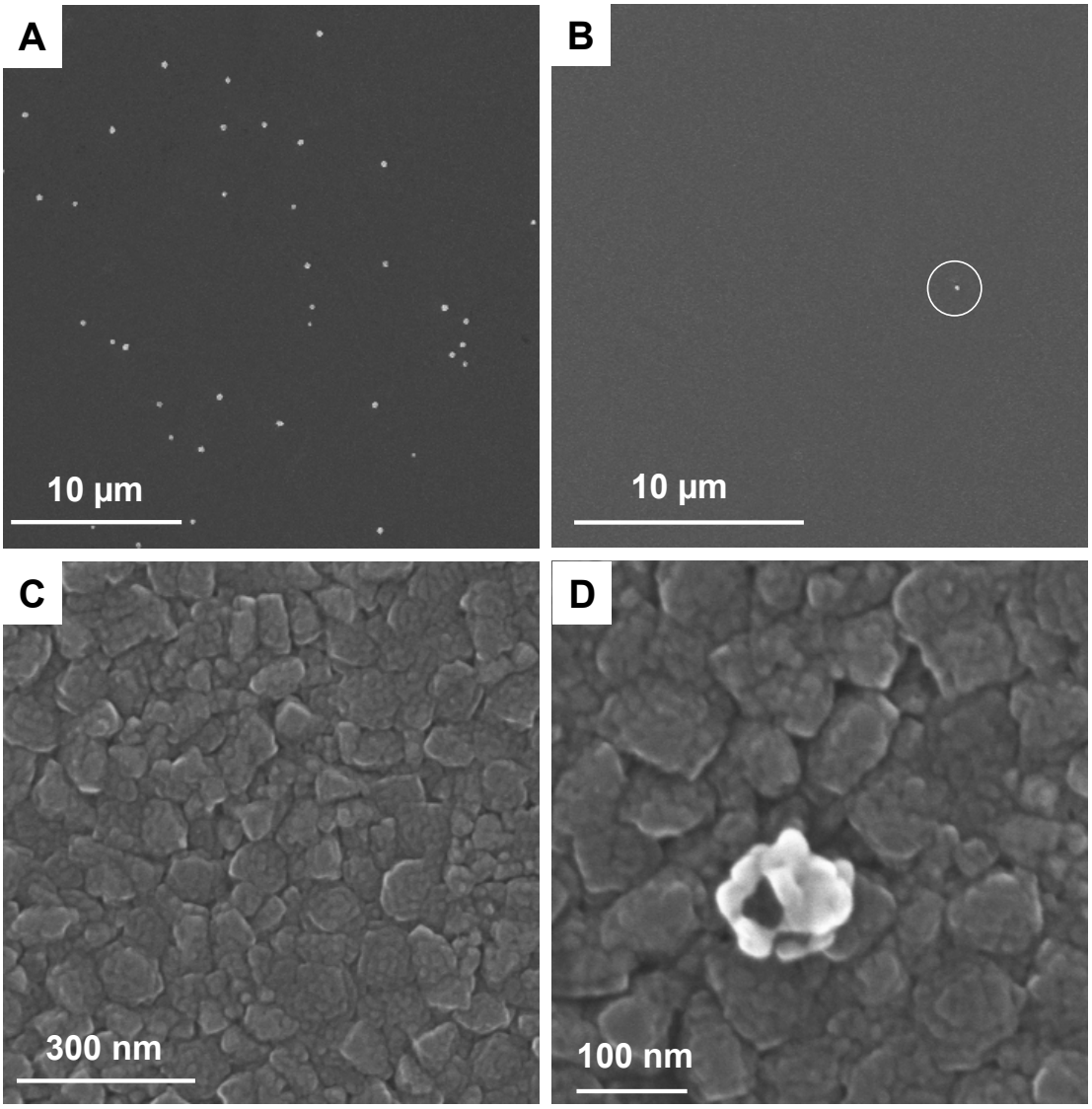

Figure S4. SEM images of Glass/ITO/Au NP samples prepared by deposition at 0.8 V A) before electrochemical oxidation and B-D) after electrochemical oxidation. The circle in Frame B shows the area imaged in Frame D.