Electrocatalysis at Single Nanoparticles

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Appendix B:
Additional experiments for chapter 4

Overview of the Faraday Cage and flow-cell

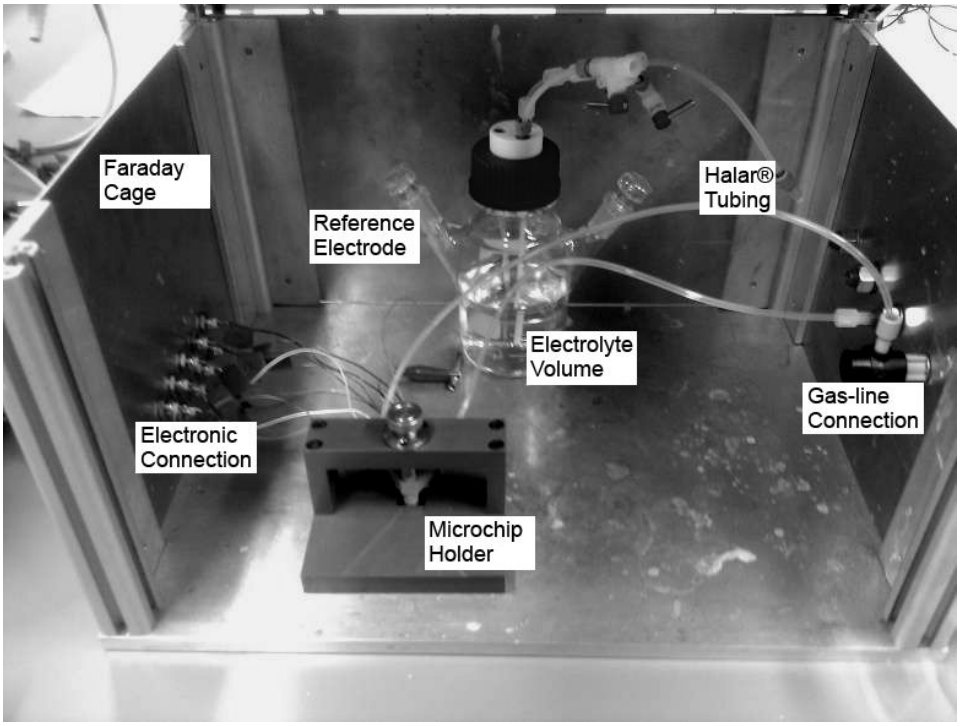


Figure 1: A photograph of the Faraday Cage used throughout the experiments described in chapters 3 and 4. Halar tubing is used to transport electrolyte from the source volume, via the microchip, to the drain volume (consisting of a glass cell not depicted here to maintain clarity). Commercial reference electrodes are inserted in the source volume through the NS15 ground joint.

Landing Pt NPs on a commercial UME

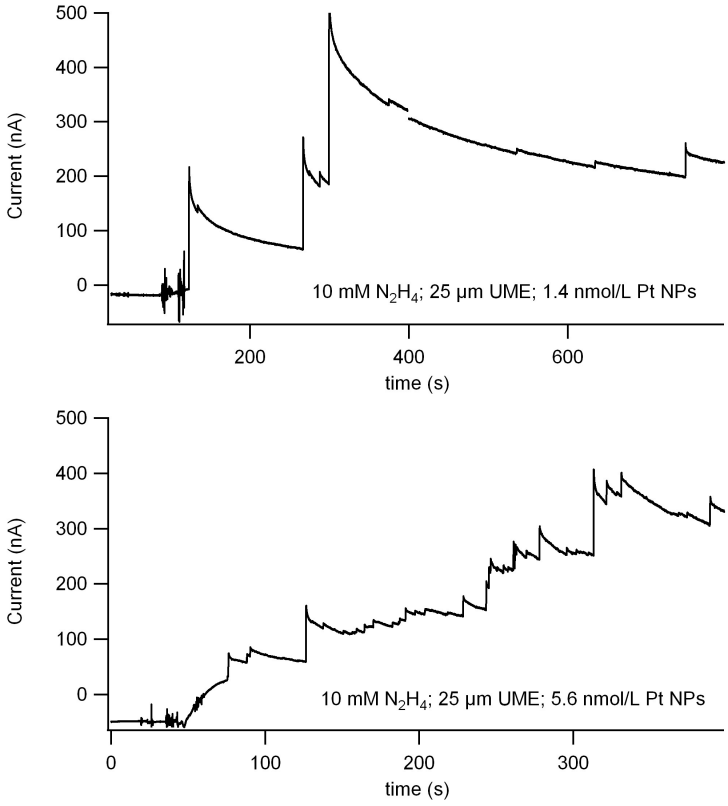


Figure 2: Pt NPs impacting on a 25 µm Au UME in a glass cell containing 100 mL of 10 mM pH 8 phosphate buffer, for two different Pt NP concentrations.

The use of hydrogen as electrocatalytic substrate

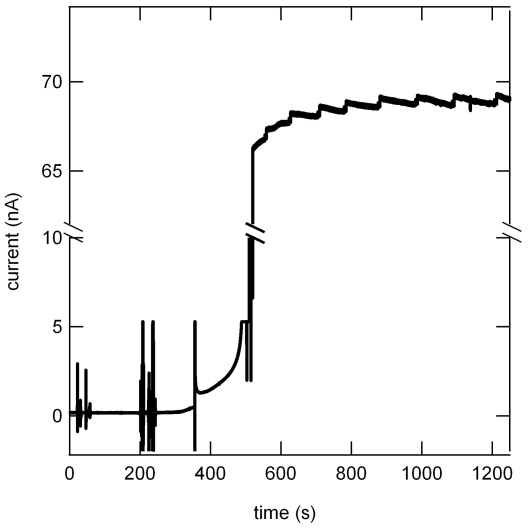
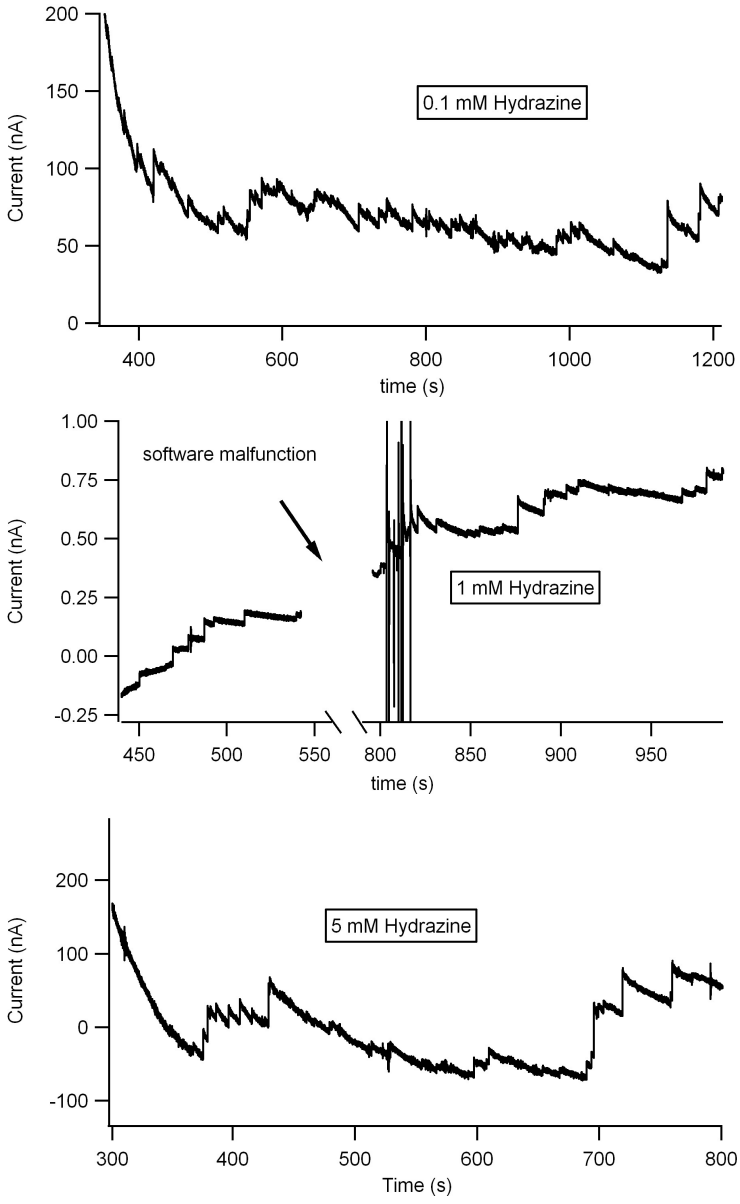
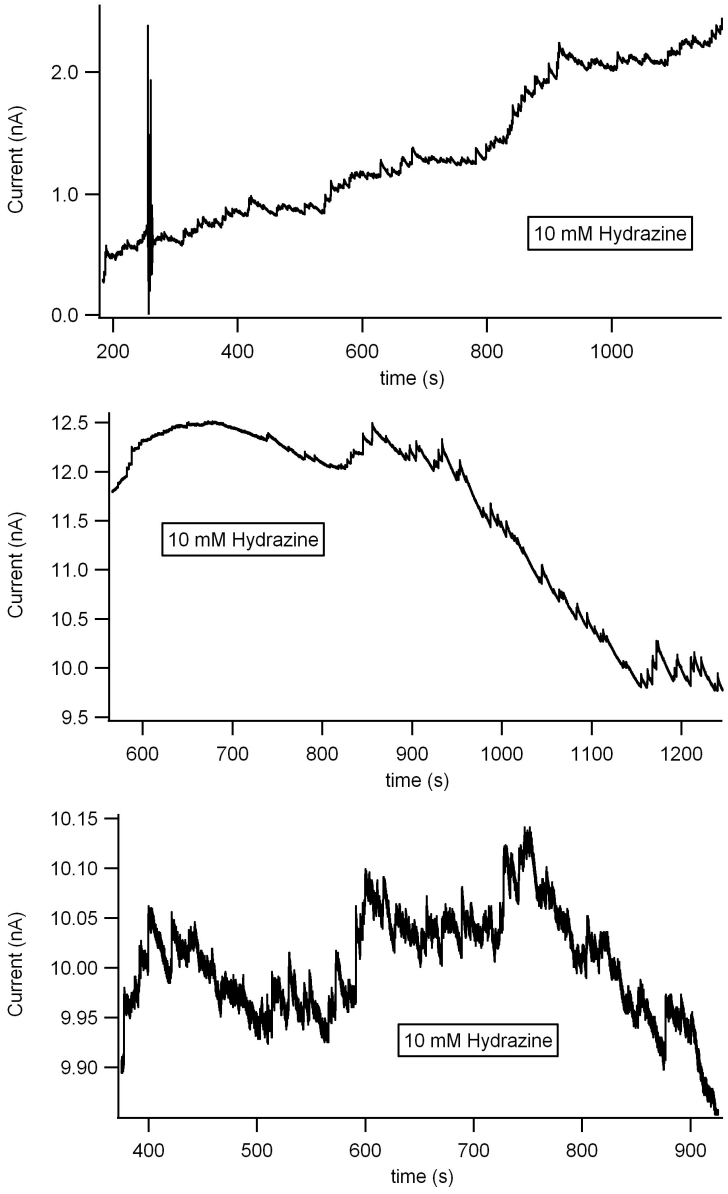


Figure 3: NP detection using H_2(g) as the electrocatalytic substrate, in 10 mM phosphate buffer at pH 8, with an applied potential of 0.5V.

The influence of the hydrazine concentration




Current (nA)
2.0
1.0
0.0
200
400
600
800
1000
time (s)
10 mM Hydrazine
Current (nA)
12.5
12.0
11.5
11.0
10.5
10.0
9.5
600
700
800
900
1000
1100
1200
time (s)
10 mM Hydrazine
Current (nA)
10.15
10.10
10.05
10.00
9.95
9.90
400
500
600
700
800
900
time (s)
10 mM Hydrazine

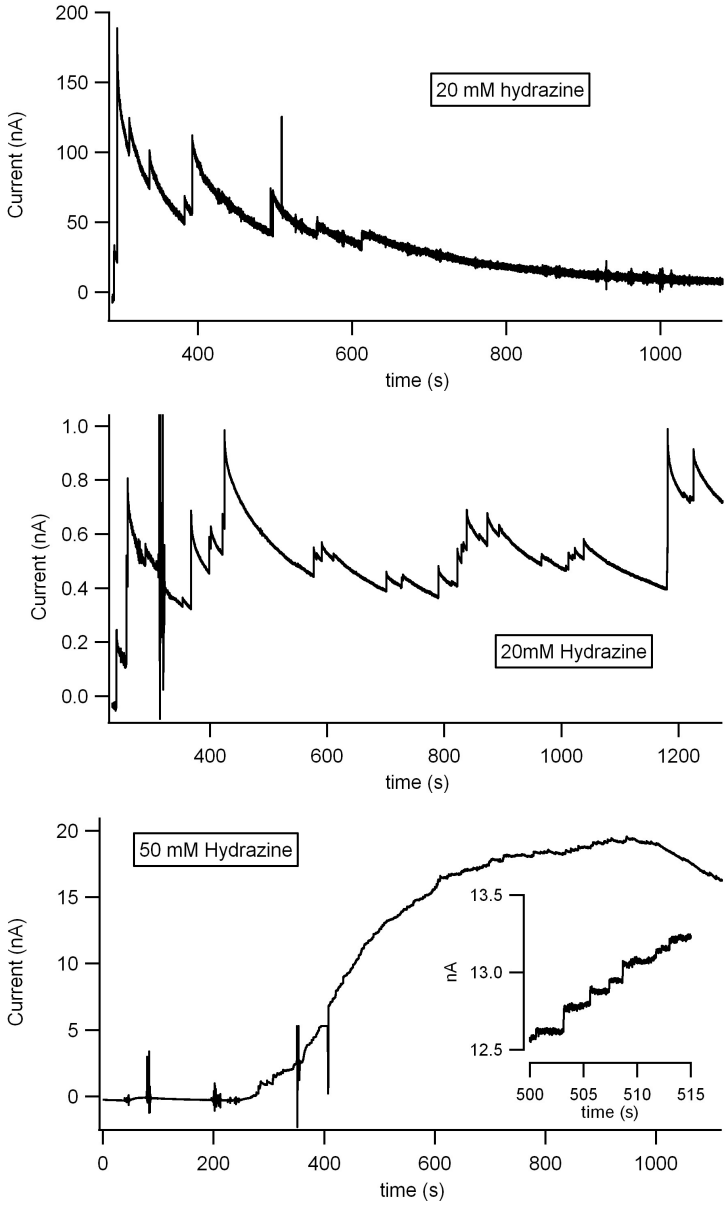


Figure 4: Chronoamperometric measurements of Pt NP impacts on lithographically patterned Au UMEs, using ascending concentrations of hydrazine. The order of data presentation maintains that of table 1 in chapter 4.