**Supporting Information**

# Preparation and characterization of carbon nano powder paste ultramicroelectrodes as tips for scanning electrochemical microscopy applications

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This document contains VEECO profile images of the ultramicrocavity formed at the dissolution time of 10 and 15 min. The profile image for 20 min dissolution time did not show interference from the bottom of the cavity. At a smaller dissolution time, interference from the bottom of the cavity was observed, as shown in Figure S1 and S2. For the 10 and 15 min dissolution time the average depths of the cavity were 1.8 and 3.1 μm respectively. Confocal microscopy showed the average depth of the ultramicrocavity of 4.2 μm on 20 min dissolution. Thus the dissolution rate was 0.24 μm/min with the incubation period of ~2 min.

Cyclic voltammetry at different scan rates in 0.1 M $KNO_3$ solution was carried out to measure the capacitance of the carbon paste electrode (Figure S3). The average of the cathodic and anodic currents at 0.1 V at different scan rates were plotted with respect to the scan rate of the measurements (Figure S3 C). The capacitance of the electrode was determined from the slope of the linear fit between the measured average current with the scan rates. The capacitance value of the carbon paste electrode was 32.5 $\mu F/cm^2$.

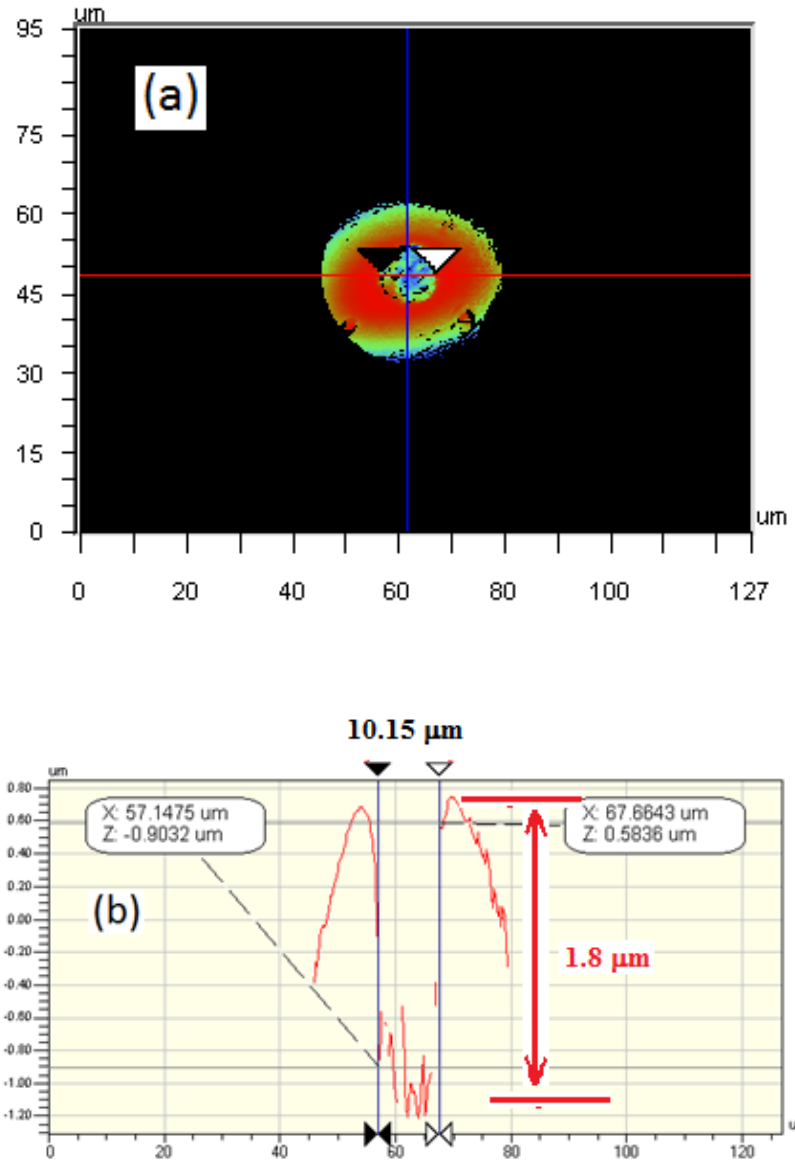
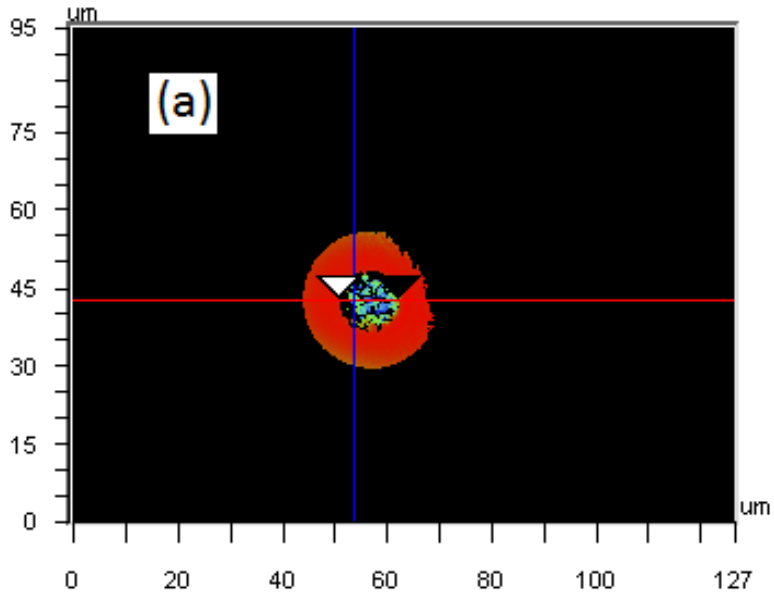



Figure S1. (a) Image from the VEECO profiler of the ultramicrocavity formed by dissolving the Pt wire for 10 min from the top of the 10 µm Pt UME. (b) Cross sectional view of x-axes section of the ultramicrocavity.



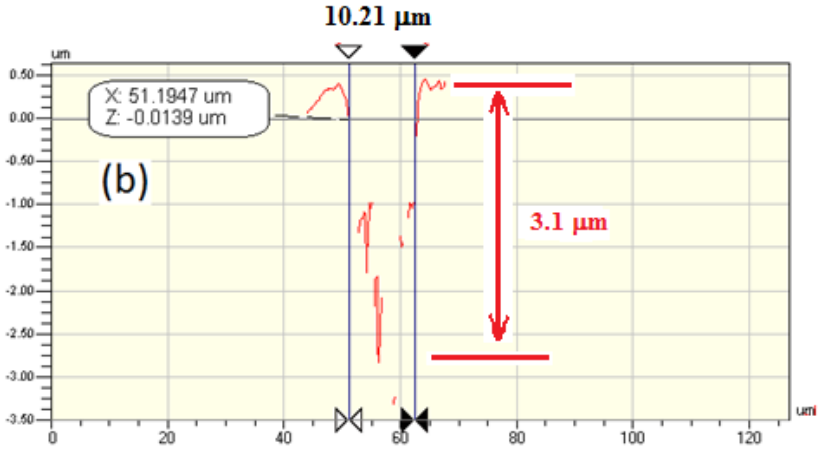
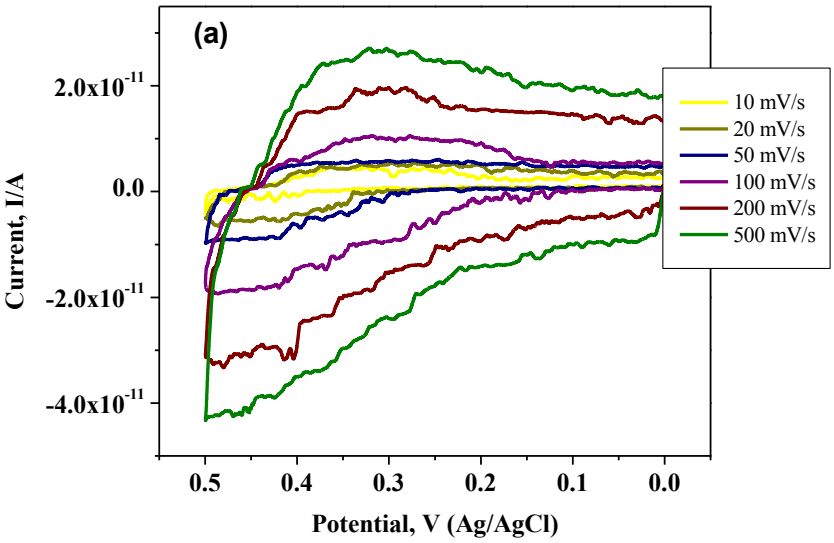
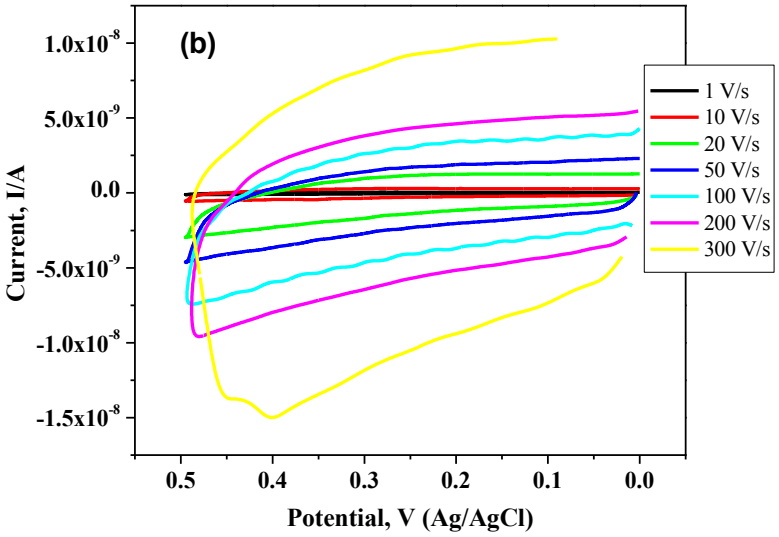




Figure S2. (a) Image from the VEECO profiler of the ultramicrocavity formed by dissolving the Pt wire for 15 min from the top of the 10 µm Pt UME. (b) Cross sectional view of x-axes section of the ultramicrocavity.


(a)
2.0x10-11
0.0
-2.0x10-11
-4.0x10-11
Current, I/A
0.5
0.4
0.3
0.2
0.1
0.0
Potential, V (Ag/AgCl)
10 mV/s
20 mV/s
50 mV/s
100 mV/s
200 mV/s
500 mV/s


(b)
1.0x10-8
5.0x10-9
0.0
-5.0x10-9
-1.0x10-8
-1.5x10-8
Current, I/A
0.5
0.4
0.3
0.2
0.1
0.0
Potential, V (Ag/AgCl)
1 V/s
10 V/s
20 V/s
50 V/s
100 V/s
200 V/s
300 V/s

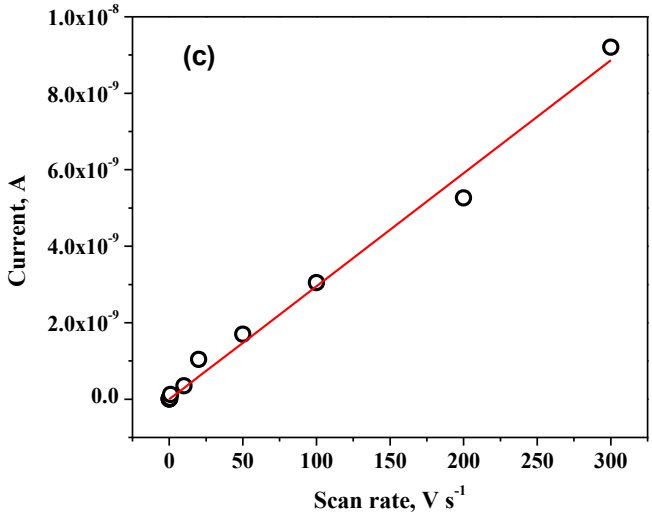



Figure S3. (a) and (b) cyclic voltammogram of 0.1 M $KNO_3$ solution using carbon paste UME at different scan rates. (c) Plot of measured current with respect to the scan rate used for the cyclic voltammetry experiments.