ItalSens Gold SPE IS-W1-2.C1.RS.50

1 Description

Figure 1 ItalSens IS-W1-2.C1.RS.50 cut into single units

The three-electrode electrochemical cell has a gold working electrode, suitable for a wide range of analytical applications. Each electrode is produced by screen-printing technology and constitutes a circular gold working electrode (2 mm diameter), a silver pseudo reference electrode, and a gold counter electrode. The small electrode dimensions reduce the required sample volumes and the low costs permit disposable use.

The electrodes are delivered as strips of 29 pieces, which are already cut for you.

Samples can be applied as a droplet due to the design of the electrodes. This avoids the waste of reagents and samples. The electrodes can be modified through direct adsorption, chemical binding, etc., and a wide range of biomolecules can be linked to the electrode surface. These customizations make the gold electrodes suitable for a broad spectrum of applications.

1.1 Application Advice

The silver pseudo-reference electrode shows higher stability in the presence of chloride ions. Hence, it is recommended that measurements are carried out in solutions with a chloride ion concentration of at least 10 mM.
We also recommend electropolishing the electrodes before using them, especially for self-assembled monolayer formation. Electropolishing can be easily performed by cyclic voltammetry. Put 100 µL of 0.5 M sulfuric acid on the three electrodes or immerse the three electrodes in 0.5 M sulfuric acid. 3 Scans from 0 to 1.4 V with a scan rate of 0.1 V/s should suffice.

2 Technical Specifications

Dimensions: 1 x 5 cm
Working electrode dimensions: 3.14 mm²
Substrate: Valox
Thickness: 650 µm
Contact pad pitch: 2.54 mm
Coefficient of Variation (CV, After polishing) (n = 10): 9 %

3 Measurements

3.1 Electropolishing

All measurements were performed with a droplet of solution covering all three electrodes of the cell. The solution contained 0.5 M H_2SO_4.

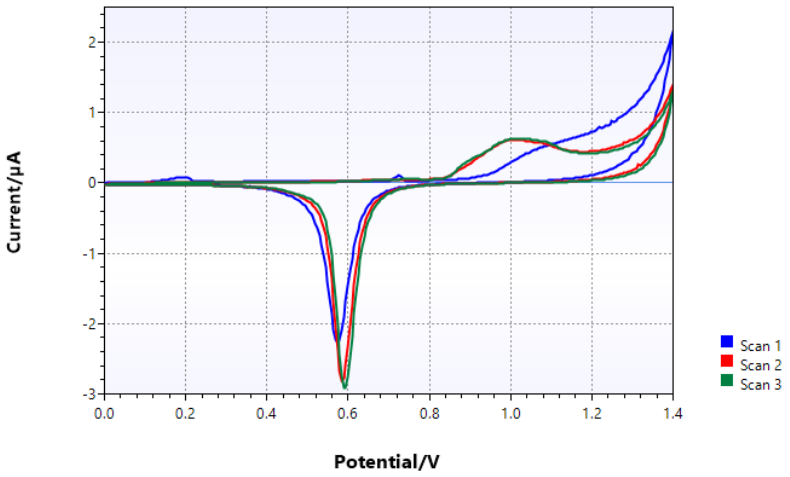

Figure 2 CV, IS-W1-2.C1.RS.50, scan rate 0.1 V/s, E step 5 mV

3.2 Cyclic Voltammogram

All measurements were performed with a droplet of solution covering all three electrodes of the cell. The solution contained 2.5 mM $K_3[Fe(CN)_6]$, 2.5 mM $K_4[Fe(CN)_6]$, and 0.1 M KCl.

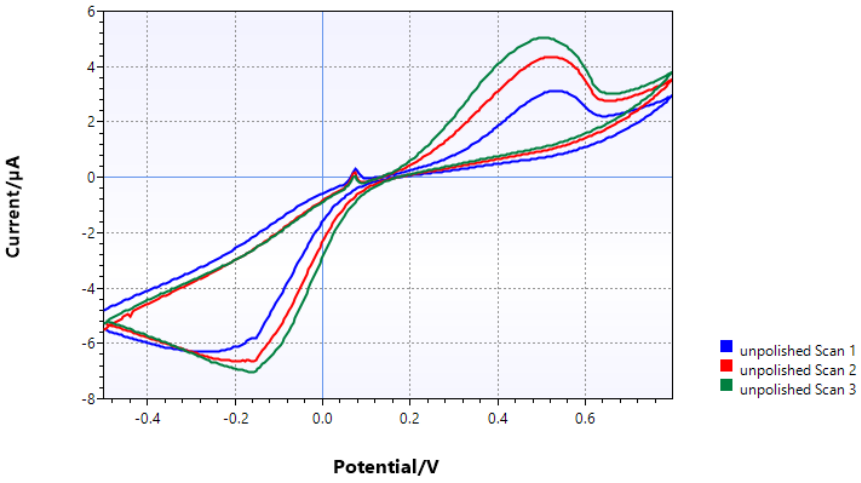

Figure 3 CV, IS-W1-2.C1.RS.50, scan rate 0.1 V/s, E step 5 mV

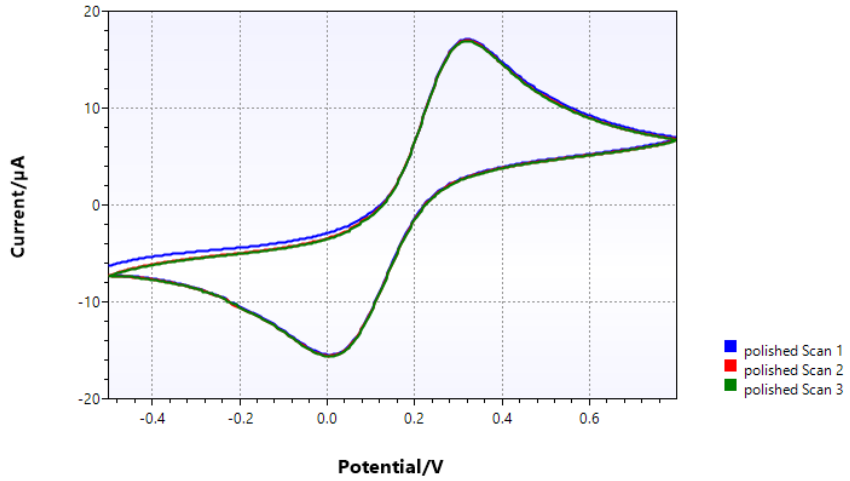

Figure 4 CV, electropolished IS-W1-2.C1.RS.50, scan rate 0.1 V/s, E step 5 mV

Before any treatment, the peak height and peak separation vary, but after electropolishing the electrodes' CVs are uniform.

3.3 Electrochemical Impedance Spectroscopy

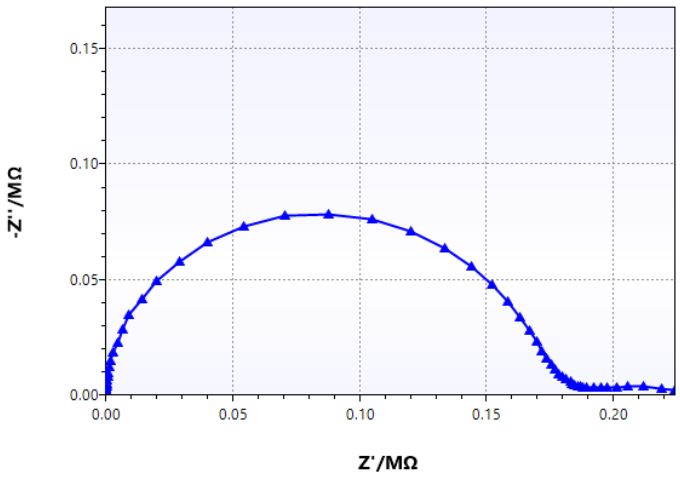

Figure 5 EIS, IS-W1-2.C1.RS.50, E dc OCP, E ac 10 mV, frequency range 0.1 Hz to 1 MHz

Before any treatment, the impedance varies between electrodes of the same batch. After electropolishing, the IS-W1-2.C1.RS.50 shows usually lower impedance, and the variation of the impedance is reduced as well.

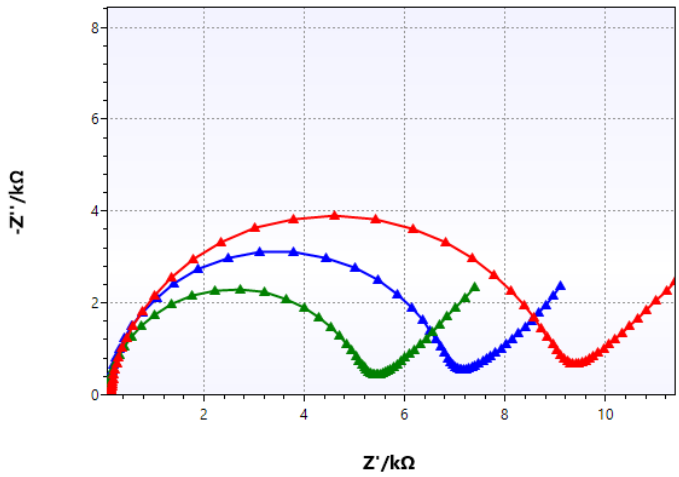

Figure 6 EIS, multiple polished IS-W1-2.C1.RS.50, E dc OCP, E ac 10 mV, frequency range 0.1 Hz to 1 MHz

4 Application Examples from Peer-Reviewed Publications

- F. Lucarelli, G. Marrazza, M. Mascini, “Enzyme-based impedimetric detection of PCR products using oligonucleotide modified screen-printed gold electrodes”, Biosensors and Bioelectronics, 20, 10, 2005, 2001-2009. https://doi.org/10.1016/j.bios.2004.08.025
- S. Laschi, I. Palchetti, M. Mascini, “Gold-based screen-printed sensor for detection of trace lead”, Sensors and Actuators B: Chemical, 114, 1, 2006, 460-465. https://doi.org/10.1016/j.snb.2005.05.028
- S. Laschi, G. Bagni, I. Palchetti, M. Mascini, “As(III) voltammetric detection by means of disposable screen-printed gold electrochemical sensors”, Analytical Letters, 40, 16, 3002 - 3013. https://doi.org/10.1080/00032710701645703