



# Electrochemistry on the tip

Scanning Electrochemical Microscope

# The SENSOLYTICS Scanning Electrochemical Microscopes

- versatile
- upgradeable to suit your needs
- ready to start „out-of-the-box“



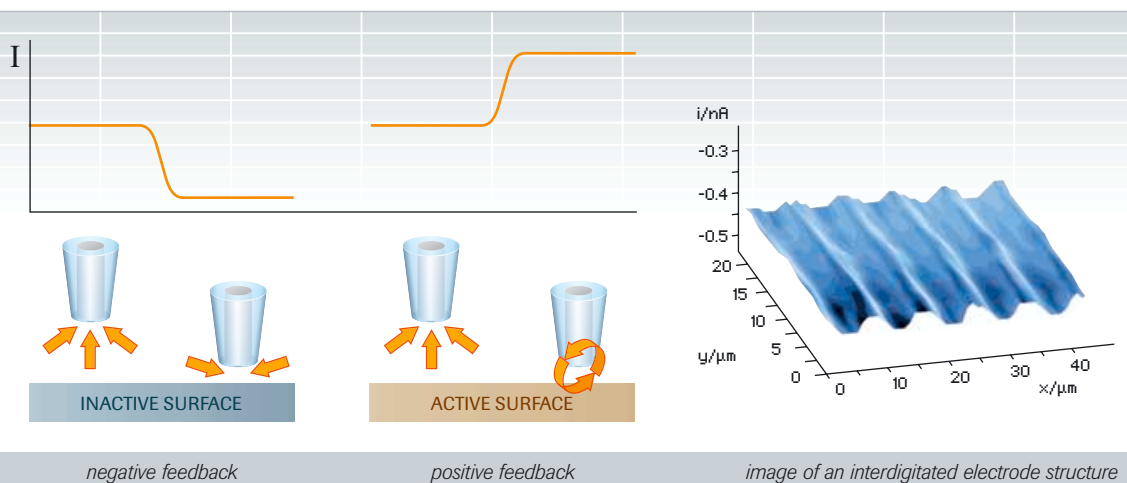
In scanning electrochemical microscopy, a microelectrode (tip or probe in terms of SPM) is scanned across a surface of a sample in close proximity to map the local electrochemical activity of the surface.

## Electrochemistry at the tip

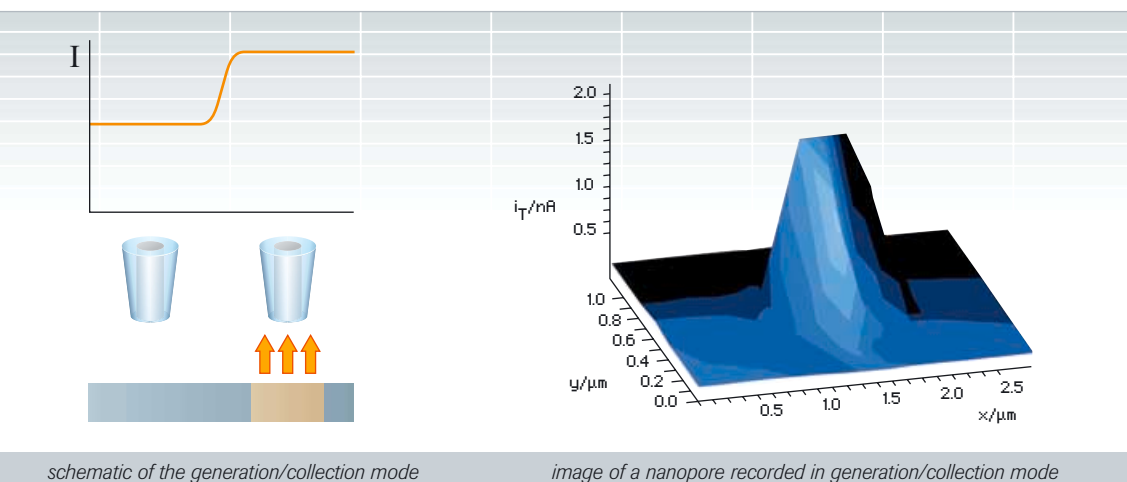
At short distance, the electrochemical process at the microelectrode gets influenced by the properties of the sample. The so-called feedback mode discriminates between electrochemically active and non-active areas of the surface.

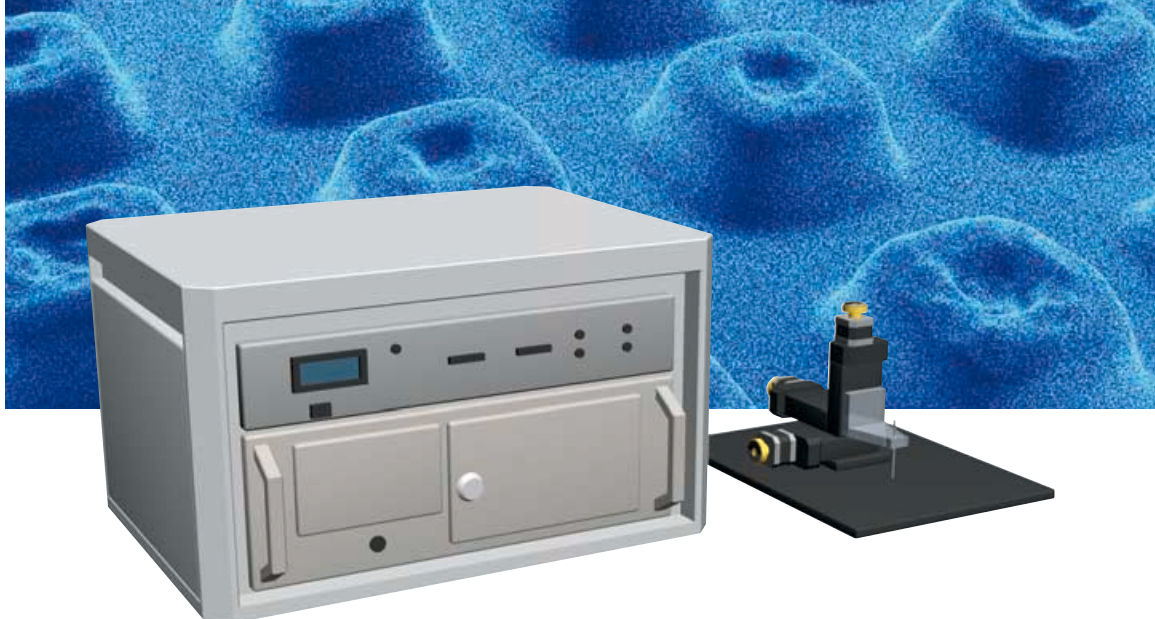
When approaching an electrochemically non-active surface, the hemispherical diffusion towards the microelectrode is blocked by the surface. Less redox species can reach the electrode surface, causing the measured current to decrease (negative feedback).

Electrochemically active surfaces enable the recycling of the redox-mediator, which in turn causes the current to increase (positive feedback).



While the feedback mode needs a reversible redox-mediator, the generation/collection mode typically detects electro-active species, which are produced at active moieties of the sample. For this purpose, Sensolytics SECM systems are equipped with a bipotentiostat, which additionally allows the sample to be biased.





## Sensolytics Base-SECM

The starting point for all SECM experiments: a complete scanning electrochemical microscope, including:

- a high-quality steppermotor-controlled xyz-positioning system: 25x25x25 mm range at 1/32  $\mu\text{m}$  resolution
- a powerful PalmSens bipotentiostat offering all the EC-techniques you need
- full system control via an industrial PC (peripherals not included)

This system is directed primarily at scanning rather flat surfaces with electrode diameters typically in the range of 10 to 50  $\mu\text{m}$ .

### OPTION 'HIGH-RES'

To increase the imaging quality of the Sensolytics Base-SECM, the option 'High-Res' provides a piezoelectric positioning system. It offers a 3 nm resolution with a 100x100x100  $\mu\text{m}$  scan range and also includes a three-point tilt compensation mechanism.

### OPTION 'AC'

To satisfy the growing interest in corrosion science, the option 'AC' is able to perform alternating current measurements (impedance spectroscopy) at each point of your sample with your Sensolytics SECM.

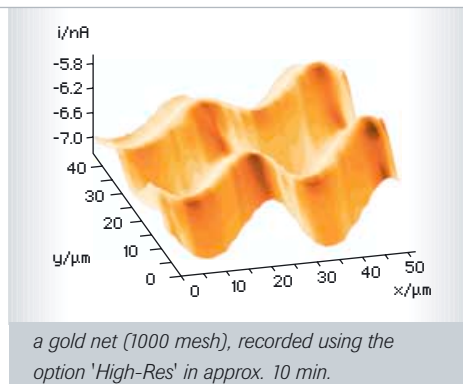
### OPTION 'SHEARFORCE'

To precisely separate topographic and electrochemical information, the option 'Shearforce' provides the ability to control the tip-to-sample separation. The tip is held at a constant distance of 50 to 300 nm above the sample surface by means of a sophisticated feedback mechanism.

### THE PROBE: MICROELECTRODES, ULTRAMICROELECTRODES, AND NANODES

Sensolytics offers an extensive collection of different SECM tips: disk electrodes with active electrode areas in the micro and ultramicro range (100-25  $\mu\text{m}$  and 25-1  $\mu\text{m}$ , respectively), and even nanodes with active electrode areas in the submicrometer range.

A key concept of our SECM-systems is the modular structure. Sensolytics customers are free to upgrade their system with additional options at any time. This system grows with your specific needs. Furthermore, we are not limited by the specifications you find here. If you need a customized solution, we can provide it...



## Sensolytics - The company

Sensolytics is a spin-off company, founded in 2004 at the Ruhr-University of Bochum, Germany. The Sensolytics portfolio includes scanning electrochemical microscopes as well as devices for on-line monitoring, process control and bioanalysis.

## TECHNICAL DETAILS

Positioning System:	Three axis steppermotor-driven positioning system Travel: 25x25x25 mm Resolution: 20 nm (calc.)	
Electrochemistry:	All systems are equipped with a computer controlled bipotentiostat. An advanced setup integrates Autolab Potentiostats - ask for further information...	
potential range:	±2 V	
potential resolution:	1 mV	
maximum current:	±10 mA	
Working Electrode 1:	available EC-techniques: Amperometry, CV, DPV,	Working Electrode 2:
current range:	10 pA – 10 mA (10 ranges)	Amperometry
current resolution:	0.1 % of current range	1 nA – 10 mA (8 ranges)
accuracy:	≤ 0.3 % of current range	0.1 % of current range
	≤ 0.5 % at 10 nA	
	≤ 1 % at 1 nA	
Scanning Modes	Constant Height Optional tilt correction Current-dependent z-control	

Option 'AC'	Allows „Alternating Current Measurements“ (Impedance Spectroscopy) at high resolution. For this option, an external potentiostat with suitable bandwidth is needed - ask for further information...
Option 'High-Res'	Additional piezo-driven positioning system Travel: 100x100x100 µm Resolution: 1 nm (calc.)
Option 'Shear-Force':	The Shear Force Option is based on a piezo-piezo based read-out of interactions between tip and sample surface that occur at a tip-to-sample separation smaller than 300 nm.

Please contact us for further information

Your Distributor:

