



**Wolflabs**

# Wolf Laboratories Limited

[www.wolflabs.co.uk](http://www.wolflabs.co.uk)

Tel: 01759 301142

Fax:01759 301143

[sales@wolflabs.co.uk](mailto:sales@wolflabs.co.uk)



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# ECIS Z

Electric Cell-substrate Impedance Sensing

## Redefining the cell-based assay!

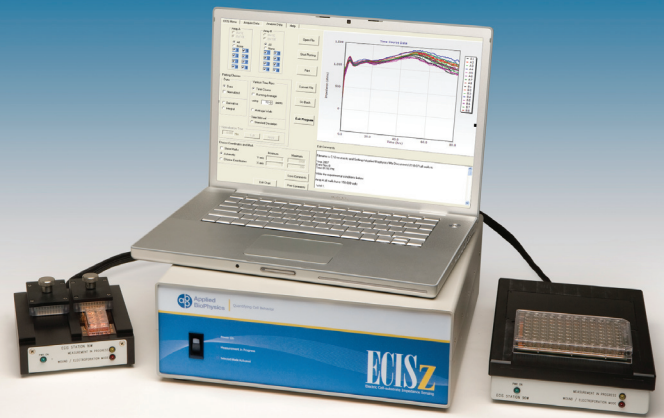
The ECIS Z is a turnkey system that provides researchers with an advanced, automated, non-invasive means to monitor cell behavior in real-time and without the use of labels.

ECIS monitors the impedance of small 250-micrometer diameter electrodes used as substrates for cell growth. As cells grow on the electrode they constrict current flow altering the impedance. The ECIS Z can be run on one of 8 different preset AC frequencies, and the impedance of a well can be sampled as often as 5 points per second.

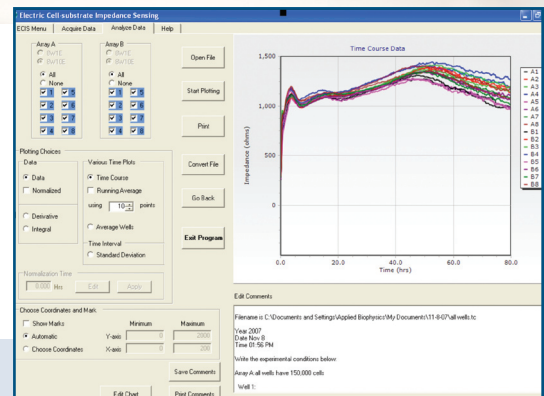
The ECIS Z reliably monitors up to 16 or 96 tissue culture wells. The ability to interface with both 16 and 96 wells stations can provide significant cost savings when researchers want to either increase throughput for screening research or carry out studies requiring fewer wells.

The ECIS Z consists of a system controller, 16 and/or 96 well station, arrays, computer; integrated software runs on XP, Vista or Mac OS. Accessories include an optional flow module for specialized cell applications under flow conditions as well as an elevated field module to carry out automated wound-healing and electroporation experiments.

**Fast • Reliable • Reproducible • Highly sensitive**  
**• Quantitative • Accurate • Real-time**



New, user-friendly, software interface allows versatility for data acquisition and analysis.



### Published Application Include:

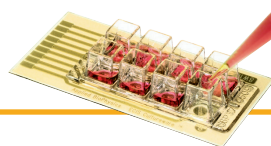
Signal Transduction  
 Wound-healing  
 Electroporation  
 Cell Migration  
 Invasion  
 Extravasation  
 Cell-Cell Interactions  
 Adhesion & Spreading  
 Motility

Proliferation  
 Apoptosis  
 Cell Growth  
 Cells Under Flow  
 ECM Interactions  
 Cytopathic effects  
 Cytotoxicity



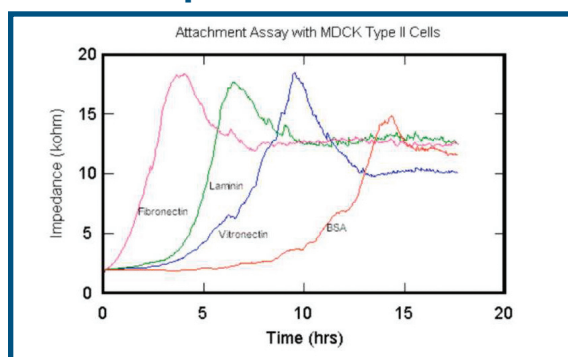
**Applied BioPhysics**

Quantifying Cell Behavior



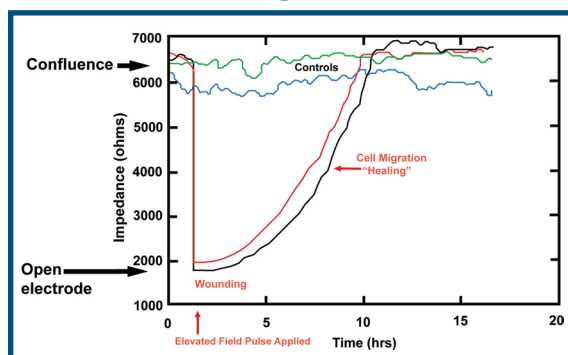
## Data Output

### Z v. T Impedance v. Time



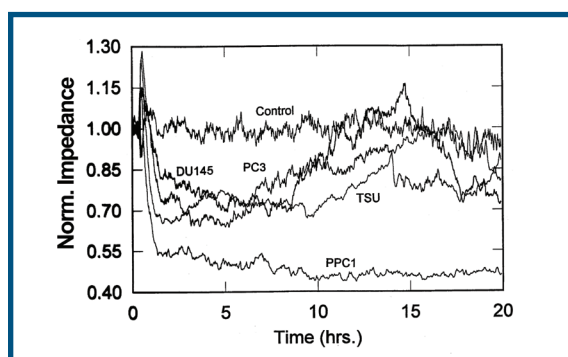
Used for general morphological changes in cells. Data shows attachment and spreading of cells on various adsorbed protein layers.<sup>1</sup>

### Cell Migration



Automated real-time wound-healing assay to measure various rates of migration.<sup>2</sup>

### Metastatic Potential



Data shows the extravasation of an endothelial layer upon exposure to metastatic cell lines.<sup>3</sup>

1: Courtesy of Dr. Ivar Giaever & Dr. Charles Keese

2: Courtesy of Dr. Ivar Giaever & Dr. Charles Keese

3: Keese, C. R. Bhawe, K. Wegener, J. Giaever, I. "Real-Time Impedance Assay to Follow the Invasive Activities of Metastatic Cells in Culture", *BioTechniques* 33:842-850 (October 2002).

## Instrument Features:

### Array Stations

- 16 or 96 wells station option
- 16 well station accepts any combination of two 8 well arrays

### Experiment Setup

- Quick well check confirms electrical connection
- Electrode stabilization cleans and prepares electrodes for measurement

### Data Acquisition

- Continuous multiple frequencies over time (8 preset frequencies)
- Continuous single frequency over time (frequency variable from 4 to 64 kHz)
- Rapid time collection
  - Single frequency - up to 5 points per second
  - Multiple frequency - 10 seconds per well
- User specified time interval between data points
- User specified time limit on data collection
- Automatic file name generation
- All experiment parameters & operations automatically recorded in data files

### Data Analysis

- Analyze data while data collection is in progress
- Export data to CSV for easy import to Excel etc (Excel is included with systems)
- Open and analyze multiple data sets
- Import CSV files from previous ECIS software

### Graphing Options:

- Interactive pan, zoom, data cursor
- Lines, points or both (2D)
- Grid lines, Legend
- Logarithmic X or Y axes (2D)
- Time Marks indicating (Wound, Pause, User Mark)
- 3D plotting of multiple frequency time course data
  - Surface lines, shading or both
  - Interactive graph rotation
  - Color bar (for surface plots)

### Graph Views: (4 variations)

- Z vs time
- Multiple wells over time
- Single well 3D surface, Z v. time v. frequency

### Data Processing Options:

- Normalize across multiple wells
- Running average
- Standard deviation
- Grouping of multiple wells (averaged)
- Optional standard deviation error bars of grouped data
- User defined time offset

### Graph Export Options:

- User defined size
- Copy to clipboard (PC only)
- Save graph as 13 file types: .mat, .ai, .bmp, .eps, .emf, .jpg, .pcx, .pdf, .pbm, .pgm, .ppm, .pkm, .tif