

cellZscope[®] – The Automated Cell Monitoring System

The cellZscope is a device for measuring the transepithelial / -endothelial impedance of cell layers under physiological conditions. It is computer-controlled and allows automated, long-term monitoring experiments with up to 24 different cell cultures simultaneously. Various types of barrier-forming cells cultured on permeable membranes can be analyzed. The ohmic resistance (TER, transepithelial / -endothelial resistance) and capacitance (C_{cl}) of the cell layers under investigation are provided as convenient readout parameters. The cellZscope is easy to operate and has a broad range of possible applications. In particular, it is ideally suited for studying the influence of substances such as drugs, toxins etc. on the barrier function of cell layers.

Hardware

The cellZscope measures the impedance of barrier-forming cell cultures grown on permeable membranes. It works with standard cell culture inserts and is fully compatible with a broad range of inserts from different manufacturers, e.g. BD Biosciences, Corning, Greiner Bio-One, Millipore, and Nunc. The cell module can be loaded with a maximum of 24 inserts simultaneously. Three versions of the module are available which are optimized for use with small ("24-well" type), mid-sized ("12-well" type) or large ("6-well" type) inserts, respectively. During an experiment the cell module is typically placed inside a standard incubator while the external controller is connected to a computer running the cellZscope software.

Software

The cellZscope comes with customized software which provides full instrument control including user defined experiment setup and data acquisition. Furthermore, it features comprehensive tools for displaying and statistically analyzing data as well as printing and exporting results.

The user interface is geared to easy operation of the instrument. It allows to:

- schedule measurements by specifying time intervals for data acquisition according to experiment requirements
- monitor results in real time
- enter individual well descriptions
- log and annotate all experimental events



The cellZscope software allows to monitor all relevant parameters during the course of the experiment, in particular it provides the

- transepithelial / -endothelial electric resistance TER and the
- electric capacitance C_{cl}

of the cell layer as easy readout parameters.



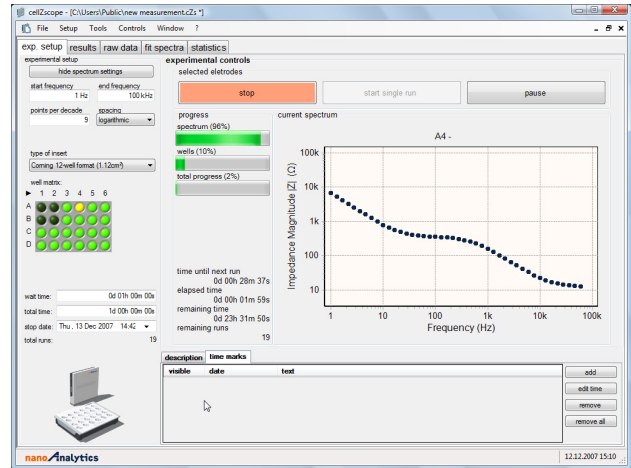
The design of the cell module warrants easy handling also under an airflow work bench. The two top covers can separately be lifted to gain free access to the wells for loading with standard cell culture inserts.



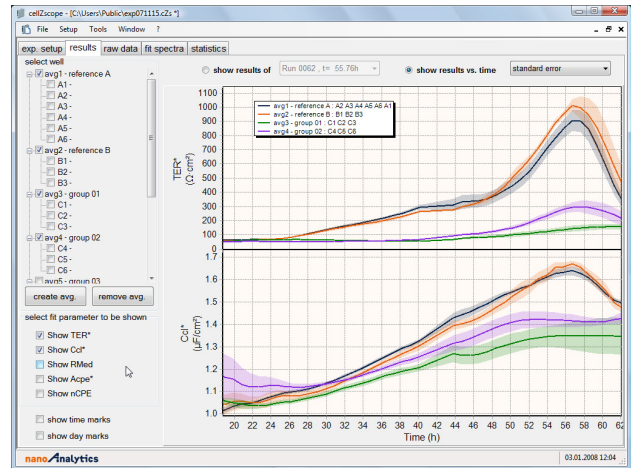
The inner and outer compartments can be reached with a pipette for convenient media exchange, cell seeding and / or adding of substances. Both the apical and the basolateral side of the cells remain accessible throughout the experiments.



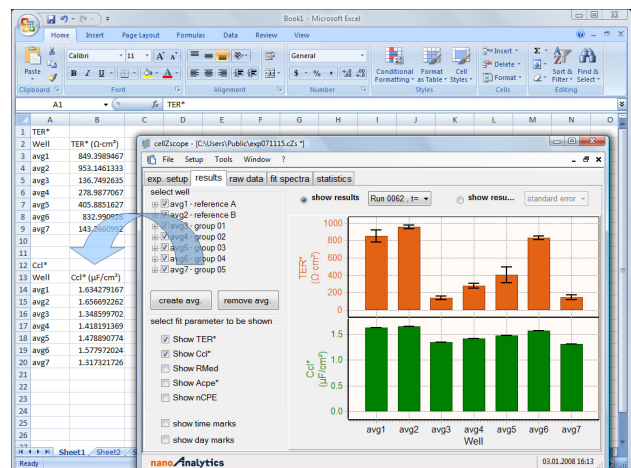
The hinged lids can be opened without having to remove the electrodes from the wells while an experiment is running. Openings in the transparent cover give access to the inner and outer compartment of each well. Medium can easily be exchanged and substances added with a pipette.



Experiment setup and data acquisition



Data display and statistical analysis



Export of data and graphics by simple “drag and drop” or “copy and paste”

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(Rev. B)