



TECHNOLOGY

Integrated CMOS Capacitance Sensors for On-Chip Tracking of Cell Proliferation

OVERVIEW

Quantifying cell growth is essential for many applications in cell biology and biotechnology. It is required for optimizing cell culture conditions, for studying substances that inhibit or promote cell growth, for studying cancer progression, cytotoxicity assessment, biocompatibility characterization, etc. Traditional cell proliferation assays are label-based endpoint assays that require sample preparation and sophisticated lab equipment. An example of an alternative, label-free technique that is being currently employed for automating cell proliferation studies is electric cell-substrate impedance sensing (ECIS). However, ECIS still requires external measurement instruments such as lock-in amplifiers and impedance analyzers.

Researchers at the University of Maryland have developed a novel miniaturized technique in which CMOS capacitance sensors are employed to measure the capacitive coupling between on-chip sensing electrodes and the cellular matrix cultured on them, as a means of tracking cell proliferation. The electrodes are arranged in a planar configuration within the growth chamber and are insulated from the cell environment in order to prevent electrochemical side-effects associated with exposed electrodes. This approach is completely electronic, does not require any sample preparation or biochemical labeling, and allows for online monitoring, experimental automation, and high speed analysis. The sensor chip is designed and fabricated using conventional CMOS technology. There is no required post-processing of the chip, except for a biocompatible packaging step. The integrated capacitance sensing platform offers an easy-to-use, portable and cost-effective solution for tracking cell proliferation in vitro, without requiring extensive laboratory infrastructure.

For additional information, please contact the Office of Technology Commercialization, University of Maryland College Park, via phone at (301) 405-3947 or e-mail at otc@umd.edu

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Engineering
- Sensors/Monitors

EXTERNAL RESOURCES

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