

STRETCHABLE Lab-on-chip Device with Impedance Spectroscopy Capability for Mammalian Cell Studies

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Abstract

This paper presents the fabrication and testing of electric cell substrate impedance spectroscopy (ECIS) electrodes on a stretchable membrane. This is the first time when ECIS electrodes were fabricated on a stretchable substrate and ECIS measurements on mammalian cells exposed to cyclic strain of 10% were successfully demonstrated. A chemical was used to form strong chemical bond between gold electrodes of ECIS sensor and polymer membrane, which enable the electrodes keep good conductive ability during cyclic stretch. The stretchable membrane integrated with the ECIS sensor can simulate and replicate the dynamic environment of organism and enable the analysis of the cells activity involved in cells attachment and proliferation in vitro. Bovine aortic endothelial cells (BAEC) were used to evaluate the endothelial function influenced by mechanical stimuli in this research because they undergo in vivo cyclic physiologic elongation produced by the blood circulation in the arteries.

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