Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

A microfluidic platform for impedance analysis and characterization of human umbilical vein endothelial cells VANESSA VELASCO, KENNY KING, ROBERT KEYNTON, STUART WILLIAMS, University of Louisville — The characterization of endothelium morphology and permeability under fluid shear stress can provide essential information regarding the onset of different pathological conditions, as well as, the uptake of drugs and biomolecules. Real-time assessment of the integrity of cell monolayers and cell motility has been accomplished by implementing electrical impedance analysis. In this study, we report a micro-electrode array biosensor incorporated into a microfluidic platform for the impedance spectroscopy of Human Umbilical Vein Endothelial Cells (HUVECs) under physiological fluid shear stress. The biosensor consists of two adjacent and identical microfluidic channels which allows for simultaneous assessment of the electrical properties of a HUVEC monolayer and that of the cell culture media alone. Additionally, the biosensor is attached to a custom designed electronic system that simplifies the data acquisition and analysis of time-dependent multiplexed measurements for the different electrodes. The impedance spectrum (40 Hz to 10 MHz) was collected for HUVECs before and under different physiological fluid shear stress forces to yield insight to flow induced changes in HUVEC morphology, permeability, and relevant electrical parameters. This biosensor can be used as an *in vitro* model of the endothelium for new drug discovery, as well as, part of biochemical assays for cell mechanism studies.

Vanessa Velasco
University of Louisville

Date submitted: 11 Aug 2011 Electronic form version 1.4