BIOMEDICAL ENGINEERING
Carnegie Mellon University

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10:30 – 11:30 a.m.
Posner Hall A35

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Biomedical Sensing Devices for Cell on a Chip and NSF Perspectives

Abstract: Direct detection and analysis of biomolecules and cells in physiological microenvironment is urgently needed for fast evaluation of biology and pharmacy. The past several years has witnessed remarkable development opportunities in vitro models from single cell to 3D tissue with multiple functions based on microfluidic devices, termed as “cell/organ-on-a-chip”. By recapitulating the multicellular architectures, cell-cell interfaces and physicochemical microenvironments, these devices enable high-resolution, real time sensing and in vitro analysis of biochemical, genetic and metabolic activities of living cells/tissues in a functional tissue and organ context. This lecture will outline NSF funded recent research activities for the fundamental study of physical and electrical properties of cells, as well as the development of a new generation of cell/organ on chips that combine aspects of “top-down” nanofabrication approach with a “bottom-up” self-assembly method for cell and tissue measurements. The biosensors can monitor crucial cell signaling networks cell metabolic pathways, as well as detecting diseases such as Alzheimer’s disease in their earliest stage, titrating drug effects and enabling worldwide remote diagnosis.

In addition, research opportunities within the Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division's “Bio clusters” within the Engineering Directorate of the National Science Foundation (NSF) will be provided.