



MON, MAR 21, 2016

10:00am-11:00am

EGR BLDG 2 RM W122

**BIOSENSORS FOR GENES,
PATHOGENS, PARASITES,
BIOMARKERS AND TOXINS**

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Abstract:

Our work over the last decade and a half has examined a number of platforms for detecting significant biological entities. These includes classical fluorescence based measurements (such as intracellular NAD(H) in bacterial and mammalian cells), optical evanescent field sensors for proteins, magneto-elastic film devices and electromechanical resonators, especially cantilevers that have integrated piezoelectric films. In this talk, I will focus on the latter device as its design has yielded extraordinary sensitivity. The methods we have developed allow for eliminating false negatives, a critical performance requirement for bioterrorism, medical, environmental and food safety applications. The cantilever sensors are self-excited devices that exhibit high-order modes near ~ 0.1 to 1 MHz and show sub-femtogram sensitivity. One significant property they demonstrate is that nonspecific binding is low or absent due to the surface being under constant out of plane oscillation. Several examples of practical importance (E. coli O157:H7, biomarkers, waterborne parasites, food and water toxins, and B. anthracis) will be illustrated using both antibody-based sensors and specific gene sequence as a molecular identifier without an amplification step.

Biography:

Raj Mutharasan received his bachelor's degree in chemical engineering from Indian Institute of Technology Madras (India) and a Ph. D in Chemical Engineering from Drexel University in 1973. After a post doctoral year at the University of Toronto in Canada, he joined Drexel University on the faculty and has been there since 1974. Currently he is the Program Director of NanoBiosensing at the National Science Foundation. He is a Fellow of American Institute of Chemical Engineers (2000), Fellow of American Institute for Medical and Biological Engineering (2006) and Fellow of the American Association of Advancement of Science (2011). He has published extensively in the areas of biosensors, bioreactors and materials processing. At Drexel, Raj directs research on cantilever, fiber optic and magneto-elastic sensors for detecting pathogens, proteins and DNA. His biosensors research is funded by the NSF, USDA, EPA, Pennsylvania Department of Health, and by the Department of Transportation/Department of Homeland Security. Mutharasan's inventions have lead to several patents – in the area of aluminum processing and biosensors.

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