Singapore-MIT Alliance for Research and Technology

BIOSYSTEMS AND MICROMECHANICS

# BioSyM Seminar Series 2017

## Models for Human Disease: An Engineering Perspective


**Prof Roger D. Kamm**

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**Date** : 06th March 2017, Monday

**Time** : 4 pm to 5 pm

**Venue** : CREATE Tower, Level 2, Theatrette

## *Abstract*


In this talk, I will summarize some of the various research projects from my lab over the past thirty years, spanning scales from molecular to whole organ, encompassing both computational and experimental methods, and emphasizing some of our most recent work in microfluidics. Topics will include respiratory and ocular fluid dynamics, cytoskeletal mechanics and mechanotransduction, and molecular simulation of protein aggregation and conformational change. In the context of microfluidics, I will focus on our recent work in developing microfluidic models of the different stages of metastatic cancer, and how microfluidics can be beneficial in providing new insights into the mechanisms of disease progression and in screening for effective cancer therapies.


## *Short Biography*

Prof. Roger D. Kamm is the Cecil and Ida Green Distinguished Professor of Biological and Mechanical Engineering at MIT and director of the NSF Science and Technology Center on Emergent Behaviors of Integrated Cellular Systems. A primary objective of Kamm's research has been the application of fundamental concepts in fluid and solid mechanics to better understand essential biological and physiological phenomena. Studies over the last 35 years have addressed issues in the respiratory, ocular and cardiovascular systems. Kamm has explored the molecular mechanisms of cellular force sensation, cell population dynamics, and the development of new microfluidic platforms for the study of cell-cell and cell-matrix interactions.

Kamm has worked to merge mechanics together with biology and chemistry by exploring the ways in which single molecules transmit force through macromolecular networks and the resulting change in molecular binding or enzymatic activity, and by developing new cell culture methods that enable simultaneous study of multiple cell types communicating in a realistic microenvironment. Recently, Kamm's work has focused on creating in vitro models of metastatic cancer and neurological disease. His cumulative work has led to more than 290 refereed publications and election to the National Academy of Medicine.