

ME DEPARTMENTAL SEMINAR

Friday, February 8, 2008

10:30 – 11:30 AM

2211 GG Brown

Daniel A. Fletcher

**Bioengineering & Biophysics, University of California - Berkeley
Physical Biosciences, Lawrence Berkeley National Laboratory**

“Reverse engineering cell mechanics”

Abstract

Far from a random collection of molecules, mammalian cells are highly coordinated machines that depend on mechanics for a wide range of behaviors. Cell movements and shape change are essential for tissue development and repair, while changes in the mechanical and motile properties of cells are associated with a growing number of diseases including cancer. In this talk, I will present our recent efforts to understand the fundamental cytoskeletal structures that govern the mechanical properties and movements of cells. We use a combination of force microscopy, optical microscopy, and microfluidics to investigate the actin filament networks in both whole cells and purified protein reconstitutions. Our studies reveal that the actin cytoskeleton is a mechanically adaptive structure capable of exhibiting complex behaviors from a simple set of components. The ability to control assembly of cytoskeletal structures will enable new understanding of disease mechanisms and may offer the ability to engineer new cell-like systems for health applications.

Biography

Dr. Fletcher received a B.S.E. from Princeton University and a D.Phil. from Oxford University, where he was a Rhodes Scholar. He received a Ph.D. in Mechanical Engineering from Stanford University as an NSF Graduate Research Fellow and was a Postdoctoral Fellow in Biochemistry at the Stanford University School of Medicine as part of the Stanford Bio-X program. He is currently an Associate Professor in the Bioengineering Department and Biophysics Program at the University of California, Berkeley where he develops optical and force microscopy techniques to study the mechanics of cell movements and the cytoskeleton. His research has received an NSF CAREER Award, a National Inventors Hall of Fame Collegiate Award, and several patents. Dr. Fletcher is also Deputy Director of the Physical Biosciences Division of Lawrence Berkeley National Laboratory (LLNL), Faculty Affiliate of the California Institute for Quantitative Biomedical Research (QB3), and member of the Nanoscale Science and Engineering Group.

