Chemical and Biomolecular Engineering
Fall 2009 Seminar Series

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"Cytoskeletal Filament Polymerization Motors"

Abstract

Cell motility requires conversion of chemical energy into mechanical work. Understanding the molecular mechanisms underlying this conversion remains an active area of research in cell biophysics and cellular bioengineering. I will discuss the theory of cytoskeletal filament polymerization motors, which capture the energy released by actin or microtubule polymerization in order to generate pushing forces on membrane surfaces (e.g., during cell crawling) or to propel intracellular particles such as endosomes or invasive pathogens. Most attention will be given to actin filament polymerization motors, which move processively on elongating actin filament tips and thereby persistently attach the growing tips to a motile surface. Multi-scale models for particle propulsion accounting for diffusion limitations and filament mechanics show that many puzzling properties observed of actin-based particle propulsion (such as particle deformations, saltatory motion, and helical trajectories) are predicted to arise naturally from force generation by filament end-tracking motors.

Wednesday, October 21, 2009, 3:00 P.M.
Wu and Chen Auditorium, Levine Hall

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