CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING
100 E. Boyd, Sarkeys Energy Center, T-335
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The University of Oklahoma
Norman, Oklahoma

2011 – 2012 Seminar Series

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DR. RICHARD B. DICKINSON

PROFESSOR AND CHAIR
DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF FLORIDA
GAINESVILLE, FLORIDA

Will present a seminar on

"CELL MOTILITY BY ACTIN POLYMERIZATION MOTOR"

Actin is the most abundant protein in animal cells, and actin filaments are an essential component of the cell's cytoskeleton. Polymerization of actin filaments pushes on cell membranes in several essential cell functions, such as migration, division, adhesion, membrane transport, and cell-to-cell communication. Invasive pathogens exploit the host cell's polymerization machinery to propel themselves through tissues. Until recently, it was widely assumed that actin polymerization is a homogeneous reaction in solution, with membrane-associated proteins (so-called nucleation promoting factors or NPF's) serving only to activate the nuclei of new filaments. Pushing was assumed to occur by free tips elongating from the bulk and impinging on the membrane or microbial surface. Several years ago, we recognized that this view was incompatible with the biomolecular and biophysical properties of the propulsion of the intracellular pathogen, *Listeria monocytogenes.* These properties pointed to a fundamentally different mechanism, heterogeneous insertional polymerization in which elongating filament tips remain persistently attached to the surface. This talk will describe our "actoclampin" model for filament end-tracking motors in which NPF's operate by capturing and inserting new actin monomers onto the attached filament tip. I will show how this model was shown to be consistent with various biophysical and biochemical observations published since our original model, including our recent validation by single-filament observations. This work is a successful example of engineering modeling and analysis applied to a complex biological system to reveal the underlying molecular mechanism.

THURSDAY, DECEMBER 1, 2011
COOKIES AND COFFEE -- 2:45 P.M.
SEMINAR -- 3:00 P.M.
SARKEYS ENERGY CENTER, ROOM M-204

THIS IS A REQUIRED SEMINAR FOR CHE 5971

Accommodations on the basis of disability are available by contacting the office before the event.