Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Fingers and Comet Tails–Motility and Morphology in growing actin gels ARIEL BALTER, Indiana University, ALLAN BOWER, Brown University, JAY TANG, Brown University — Actin-based cell motility has proven to be a useful system for studying the dynamic system of polymer gel formation in the cytoskeleton. There is still no consensus regarding the exact method for the transduction of chemical energy to mechanical energy during actin based motility. Also under debate is the "symmetry breaking" which occurs in a biomimetic system used to simulate and study actin based motility. An enzyme coated bead immersed in real or synthetic cell extract will first grow a symmetric cloud of actin gel. Then the gel will spontaneously differentiate into one or more "tails." A symmetry breaking stochastic model has been proposed for the formation of one tail. We propose a model based on an elasto-chemical instability at the outer edge of the gel. Our theoretical model allows us predict when one or more tails will form as a function of system parameters, explain the observed shape of an actin "comet tail" and predict when the instability will take place. Our model is supported by finite element simulations.

Ariel Balter
Indiana University

Date submitted: 08 Dec 2004 Electronic form version 1.4