Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Fingering Instability in a Growing Elastic Gel ARIEL BALTER, Indiana University, ALLAN BOWER, Brown University, JAY TANG, Brown University — It has been experimentally observed that when an actin gel is made to grow around a small ($\sim$1 μm) bead, the gel may finger, i.e. grow a small number of stable protrusions. The case of one finger represents the case of "comet tail" motility. We present at theory for this process as an instability driven by the interplay of surface energy and elastic energy at the outer edge of the growing gel. In our theory, the number of fingers is selected by the bead size, the growth rate, the elastic modulus and the surface energy, so direct comparisons to experiment can be made. We have also simulated the process with a finite element code. Although we present this as an explanation for the morphology of actin gels around beads, in particular the formation of actin "comet tails," we suggest this as a generic process which may emerge whenever an elastic material is growing away from a curved surface and the elastic material has a stress-dependant chemical stability.

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Date submitted: 08 Dec 2004 Electronic form version 1.4