Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Energy barriers and cell migration in confluent tissues DAPENG BI, J.H. LOPEZ, J.M. SCHWARZ, M. LISA MANNING, Syracuse University — Biological processes such as embryogensis, tumorigenesis and wound healing require cells to move within a tissue. While the migration of single cells has been extensively studied, it has remained unclear how single cell properties control migration through a confluent tissue. We develop numerical and theoretical models to calculate energy barriers to cell rearrangements, which govern cell motility. In contrast to sheared foams where energy barriers are power-law distributed, energy barriers in tissues are exponentially distributed and depend systematically on the cell's number of neighbors. Using simple extensions of 'trap' and 'Soft Glassy Rheology' models, we demonstrate that these energy barriers distributions give rise to glassy behavior and use the models to make testable predictions for two-time correlation functions and caging times. We incorporate these ideas into a continuum model that combines glassy rheology with active polarization to better understand collective migration in epithelial sheets.

Dapeng Bi
Syracuse University

Date submitted: 14 Nov 2013 Electronic form version 1.4