Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Role of differential physical properties in emergent behavior of 3D cell co-cultures DAN KOLBMAN, MOUMITA DAS, Rochester Institute of Technology — The biophysics of binary cell populations is of great interest in many biological processes, whether the formation of embryos or the initiation of tumors [1]. During these processes, cells are surrounded by other cell types with different physical properties, often with important consequences. For example, recent experiments on a co-culture of breast cancer cells and healthy breast epithelial cells suggest that the mechanical mismatch between the two cell types may contribute to enhanced migration of the cancer cells [2]. Here we explore how the differential physical properties of different cell types may influence cell-cell interaction, aggregation, and migration. To this end, we study a proof of concept model– a three-dimensional binary system of interacting, active, and deformable particles with different physical properties such as elastic stiffness, contractility, and particle-particle adhesion, using Langevin Dynamics simulations. Our results may provide insights into emergent behavior such as segregation and differential migration in cell co-cultures in three dimensions.

[1] S. Suresh, Acta Biomaterialia 3, 413 (2007).
[2] M. H. Lee, P. H. Wu, J. R. Staunton, R. Ros, G. D. Longmore, and D. Wirtz, Biophysical Journal 102, 2731 (2012).

Moumita Das
Rochester Institute of Technology

Date submitted: 14 Nov 2014 Electronic form version 1.4