Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

Studying Cell Motility and Cell Mechanics with "Designer Cells"

BARTOSZ A. GRZYBOWSKI, Department of Chemical and Biological Engineering, Northwestern University

Micro/nanopatterning allows for the creation of cells of identical morphologies and with "designed" organization of the cytoskeleton. Analysis of such "Designer Cells" via high-resolution microscopy allows for studying the intracellular processes related to cytoskeletal dynamics and cancer invasiveness in quantitative detail. In addition, three-dimensional imaging can be used to reconstruct cell shapes and describe these shapes by mathematical functions - it is found that cells are constant-curvature surfaces corresponding to the minima of relatively simple energy functionals describing cell micromechanics. These and other results have implications for physical assays with which to diagnose the metastatic form of cancer.