MAR15-2014-002385

Abstract for an Invited Paper
for the MAR15 Meeting of
the American Physical Society

A Nanoengineered Framework for Probing Collective Cell Migration

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The fascinating capability of cellular self-organization (often referred as pattern formation) during tissue morphogenesis and regeneration is a central question in developmental biology, regenerative medicine, and complex systems. How do the cells of a tissue know how to organize into functional tissue structures that are much bigger than themselves? How do the individual cells know what they are supposed to do without a central coordinator or a blueprint? Furthermore, relatively little is known about how multicellular systems interpret the mechanical cues in the microenvironment, such as global geometric guidance, local cell-cell interactions, and extracellular matrix properties, to collectively drive the morphogenic process that creates complex tissue structures across multiple length scales. In this talk, I will discuss a nanoengineered framework for investigating the mechanoregulation of tissue morphogenesis, such as the capillary morphogenesis and collective cell migration during wound healing.