

# **Manipulation of Cell Behavior via Regulation of Cellular Adhesive States Using Nano- and Micropatterned Substrates**

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## **Abstract**

The implementation of surfaces presenting subcellular-sized patterns of extracellular matrix (ECM) components that allow for direct control over adhesion site organization (placement, growth, maturation) and dynamics could provide a direct approach for modulating the extent of cytoskeletal tension generated by cells and allow for precise control over adhesion-mediated signaling events. Toward this goal, I have developed surface patterning strategies that allow for the fabrication of (i) subcellular-sized patterns of ECM components that dictate adhesion site placement, growth, and maturation, (ii) multifaceted surfaces that present pattern arrays of multiple ECM components with each component confined to its own array, and (iii) cell-derived, biomimetic pattern configurations derived from images of user chosen cells of interest (COI). I have implemented these structured materials to investigate the influence of (i) adhesion maturation on cell dynamics and migration, (ii) ECM composition on differential integrin ligation and directional migration, and (iii) cell-derived, biomimetic patterning on the ability to recapitulate the adhesive state and cytoskeletal architecture of a COI. These structured materials provide new tools for basic biological studies concerning adhesion-mediated signaling and potentially a means for priming cells toward a chosen phenotype prior to use in cell-based therapeutics.

## **Bio**

Dr. Slater received a Bachelor of Science in Mechanical Engineering from the University of North Carolina at Charlotte in 2001 and a PhD in Biomedical Engineering with a Graduate Portfolio Degree in Nanoscience and Nanotechnology from the University of Texas at Austin in 2008. He was a Postdoctoral Fellow in the Bioengineering Department at Rice University until 2012 and a Research Scientist in the Biomedical Engineering Department at Duke University until 2013. He is currently an Assistant Professor in the Biomedical Engineering Department at the University of Delaware. His research interests include mechanobiology, microfluidics, biomimetic materials, and cell and tissue engineering.

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