**Assembly and Disassembly in Gels and among Cells**

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Collagen I networks are a model system distinct from most biopolymers owing to collagen fibers’ long persistence length; they thus may serve as a critical test-bed for various theories of (not so) semi-flexible polymers. We use multi-modal approaches, integrating optical microscopies with traditional measurements of structure and mechanics, to assess collagen structure at equilibrium as well as during self-assembly and deformation. This work on collagen networks was applied to designing environments for the study of cancer cell invasion. In an outgrowth of this work, we are investigating cell sorting in heterogeneous tumor models via simulation and experiment. We find that cell compaction speed, as set by primary compaction mediator, dictates preference for interior position in these model systems. In cell lines utilizing classical E-cadherin based compaction, decreasing cortex tension disrupts cell aggregation, while in integrin based compaction, reducing cortex tension dramatically increases compaction. This dichotomy allows us to alter cell organization in co-culture models, suggesting a novel approach to inhibiting cancer cell invasion.

Laura J. Kaufman graduated summa cum laude from Columbia University in 1997 with a B.A. in Chemistry and English. She earned her Ph.D. in Chemistry in 2002 from the University of California, Berkeley. There, Laura worked on multi-dimensional Raman spectroscopy of simple liquids in the laboratory of Professor Graham R. Fleming. She went on to do postdoctoral work at Harvard University under the guidance of Professors X. Sunney Xie and David A. Weitz, where she used CARS microscopy to study colloidal glasses and cell migration in three-dimensional environments. Laura has been named a NYSTAR Young Investigator, a Beckman Young Investigator, a Camille Dreyfus Teacher Scholar, and a Lenfest Distinguished Faculty Member. Her laboratory is highly interdisciplinary and focuses on the dynamics of complex, crowded systems. In particular, the laboratory studies heterogeneous dynamics in supercooled liquids with single molecule imaging, exciton diffusion in conjugated polymers at the single molecule and aggregate level with single molecule spectroscopy, the mechanical properties and structure of biopolymer gels using rheology and microscopy, and cancer cell invasion in tissue approximations of tailored architecture.