Actin Biophysics and Mechanobiology in Complex Cellular Environments

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Abstract
The assembly and mechanics of actin, an essential cytoskeletal protein, drive many important cellular processes including cell motility, division, shape maintenance/alteration, and intracellular transport. Actin assembly into double-helical filaments, with distinct mechanical and structural properties, takes place in the cytoplasm crowded with ions, macromolecules, and other binding proteins. Despite increased appreciation of macromolecular crowding effects, most in vitro studies of actin have been performed in simple dilute solutions, therefore are limited to accurately reflect filament mechanics and structure in complex cellular environments. I will present an overview of my group's work to determine molecular mechanisms by which intracellular environments modulate actin cytoskeleton mechanics, structure, and interaction with key regulatory proteins. Our study will advance the understanding of actin biophysics and mechanobiology in vivo, which are closely linked to cell physiology and human disease states.

Bio
Dr. Ellen Hyeran Kang is an assistant professor in Physics and NanoScience Technology Center at UCF. She earned her undergraduate and MS degrees in physics from Seoul National University and PhD in physics from Brown University. She was a postdoctoral associate in Molecular Biophysics and Biochemistry department at Yale University prior to joining UCF in Fall 2015. Her Molecular Biophysics Laboratory focuses on understanding mechanisms of how actin cytoskeleton biophysics and mechanics are coupled to cell physiology at the molecular level.