

Abstract Submitted
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Hierarchical Cross-linked F-actin Networks: Understanding Structure and Assembly¹ LINDA HIRST, University of California, Merced, LAM NGUYEN, Florida State University — The protein, F-actin provides us with an interesting system in which to investigate the assembly properties of semi-flexible filaments in the presence of cross-linkers. Recently it was observed that F-actin, in the presence of the cross-linker alpha-actinin at high molar ratios will generate a novel hierarchical network of filament bundles. We investigate this system using coarse-grained molecular dynamics (MD) simulation, confocal microscopy and x-ray scattering. We have studied the F-actin/alpha-actinin system in detail with different actin conc. (C) and alpha-actinin/actin molar ratios (γ). Confocal microscopy and analysis shows that the assembled systems fall into one of 3 phases depending on C and γ : (1) loosely connected network of F-actin and bundles, (2) loosely connected network of dense domains and (3) uniform network of bundles. This can be explained and replicated using MD simulation. We have also examined different types of cross-linkers to represent the proteins, fascin and filamin. Results show that phase formation is related to the flexibility in binding between F-actin and cross-linkers. This degree of freedom, possible with longer cross-linkers allows the formation of branch points and thus bundle networks.

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Linda Hirst
University of California, Merced

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