Condensation of F-Actin by Dimensional Reduction

ROBIJN BRUINSMA, Department of Physics and Astronomy, UCLA, CYRON CHRISTIAN, KEI MUELLER, Mechanical Engineering, Technical University, Munich, Germany, ANDREAS BAUSCH, Chair Cell Biophysics E27, Technical University, Muenchen, Germany, WOLFGANG WALL, Mechanical Engineering, Technical University, Munich, Germany —
We present a Brownian Dynamics simulation of the equilibrium condensation of F-actin in the presence of linker molecules. The filaments are modeled as worm-like chains, using finite element analysis. At low linker concentrations, the systems forms a gel whose physical properties do not depend on the linker molecules. If the linker concentration is increased then for isotropic linkers only a single mode of condensation is encountered: bundle formation. If the linker molecules impose a preferential angle between F-actin filaments, then condensation takes place either into a either a hexatic or squaratic two-dimensional liquid crystal phase or into a heterogeneous cluster. Condensation is driven by competition between linker and filament entropy, which imposes dimensional reduction on the F-actin aggregate.

Robijn Bruinsma
bruinsma@physics.ucla.edu