

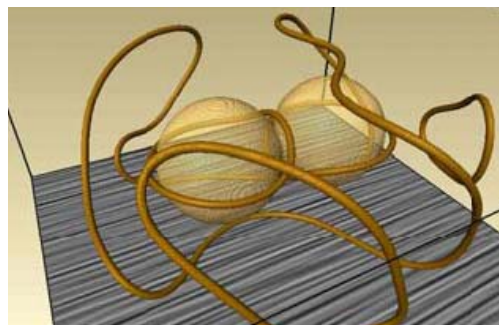
Modeling of nematic braids: assembly of colloidal superstructures for optical materials

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Our recent modeling of defects and colloidal structures in spatially confined nematic liquid crystals is described. Theoretical predictions are based on Landau- de Gennes type free energy where also effects of confinement and external fields are taken into account. The complexity of effective inter-colloidal couplings in a nematic solvent leads to numerous colloidal structures not present in simple liquids. Here we focus on thin nematic films where colloidal particles can share nematic defects. In such a case the coupling is string-like and is therefore much more robust as compared to an interaction based on an array of localized disclinations. These structures can be realized either via disclination lines that entangle colloidal particles [1] or via disclination loops with nonsingular cores where topological constrain results in sharing of a disclination by neighboring particles. The resulting colloidal dimmers, chains, lattices, and braids open new ways to the assembling of colloidal photonic crystals and hierarchical structures that can lead to metamaterials.



Formation of an entangled dimer via a nematic relaxation

[1] M. Ravnik, M. Skarabot, S. Žumer, U. Tkalec, I. Poberaj, D. Babic, N. Osterman, and I. Musevic, *Entangled Nematic Colloidal Dimers and Wires*, Phys. Rev. Lett. 99, 247801 (2007)