Complex nematic colloids: recent developments

S. Žumer[a,b], M. Ravnik[a], B. Črnko[a]

[a]Faculty of Mathematics and Physics, University of Ljubljana , Slovenia

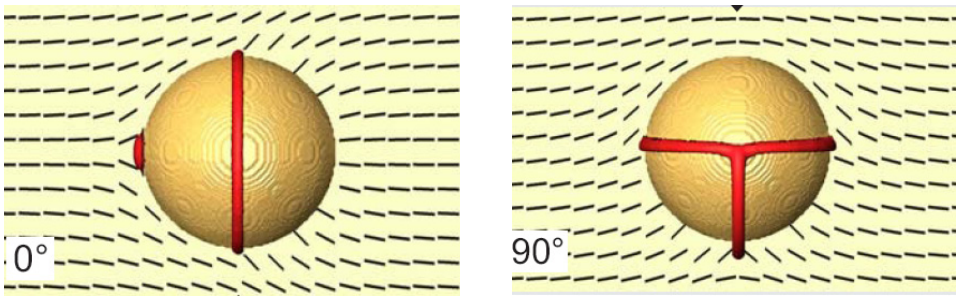
[b]Jozef Stefan Institute 1000 Ljubljana, Slovenia

Our recent theoretical studies of colloidal structures in confined nematic solvents are contrasted with the latest experimental studies. Approaches based on phenomenological description and topological theory provide useful tools for modeling of these complex structures. In nematic solvents effective inter-particle couplings lead to numerous organizations of colloidal particles not present in simple liquids. Particularly important are situations where topological constrain results in sharing of a disclination by neighboring particles that leads to a string-like coupling [1,2]. Colloidal dimmers, chains, lattices, braids, and hierarchal structures can be realized either via disclination loops with singular or nonsingular cores. Here particular attention will be focused on the stability of 2D structures and on possible assemblies in 3D. Effects of chiral distortions and confinement will be examined. Further nematic colloid based on Janus particles exhibiting planar and homeotropic anchoring on the two hemispheres will be briefly considered. We expect that some of these structures will open new ways to the assembling of complex structures for photonic and plasmonic applications.

References

(1) *Entangled Nematic Colloidal Dimers and Wires*, M. Ravnik, M. Škarabot, S. Žumer, U. Tkalec, I. Poberaj, D. Babič, N. Osterman, and I. Muševič, *Phys. Rev. Lett (2007)* ***99****, 247801*

(2) *Nematic colloids entangled by topological defects*, M. Ravnik and S. Žumer, *Soft Matter* (2009) **5**, 269



Two possible structures for Janus particles in a nematic