On the propensity of inverse patchy colloids to form planar structures

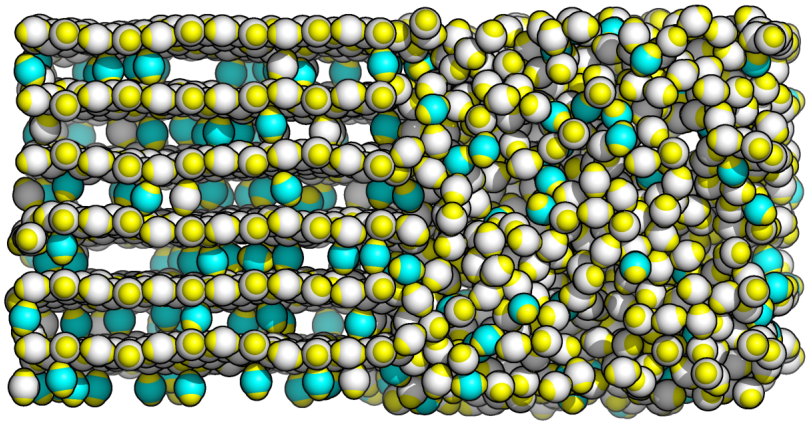
E. Bianchi[1], Eva G. Noya[2], Silvano Ferrari[1], Christos N. Likos[3] and Gerhard Kahl[1]

[1] *Institut für Theoretische Physik, Technische Universität Wien, Vienna, Austria*

[2] *Instituto de Química Física Rocasolano, CSIC, Madrid, Spain*

[3] *Faculty of Physics, University of Vienna, Vienna, Austria*

Inverse patchy colloids (IPCs) are patchy particles with differently charged surface regions[1]. These features characterize experimental model systems[2] as well as naturally occurring systems, such as proteins and virus capsids. I will present several IPC systems with two identical polar patches and I will show that, as a consequence of the intricate balance between attractions and repulsions, IPCs tend to form planar aggregates either as monolayers closed to a charged substrate[3] or as bulk equilibrium phases[4,5].



Direct coexistence between a hybrid crystal-liquid phase (left) and the fluid (right).

Among the emerging lamellar architectures formed by IPCs, I will focus on a new structure (see the figure) where the particle layers are separated by inter-layer monomers with a very specific order and behavior[5].This hybrid crystal-liquid phase is able to spontaneously assemble in bulk simulations and maintains its stability over a surprisingly large temperature range.

1. Soft Matter 7, 8313 (2011)
2. ACS Nano 7, 4657 (2013)
3. NANO letters 14, 3412 (2014)
4. Soft Matter 10, 8464, (2014)
5. Journal of Physics : Condensed Matter 27, 234103 (2015)