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Electric Field-Induced Assembly in Highly Crosslinked Ionic Microgels

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Poly(N-isopropylacrylamide) based microgels are interesting colloidal systems to probe cooperative phenomena such as structural ordering, crystal nucleation, glass formation, etc. They can be packed to effective volume fractions ϕ_{eff} beyond the hard-sphere close-packing ϕ_{cp} and their average interparticle distance, as can be smaller than the particle diameter, d [1]. Here, we report the electric field-induced assembly of highly crosslinked poly(N-isopropylacrylamide-co-Acrylic acid) (PNIPAM-co-AAc) microgels studied using confocal laser scanning microscope (CLSM) and small-angle neutron scattering (SANS). At low $\phi_{\text{eff}} = 0.04, 0.17$, in the presence of an electric field, the microgels form strings, tubes and islands of body-centered cubic (bcc) structures. Though ellipsoidal particles under the influence of an electric field formed tubes [2], no analogous tubular assembly has been reported thus far for hard or soft isotropic particles. Beyond the maximum close packing ($\phi_{\text{eff}} = 0.79, 1.07 > \phi_{\text{cp}}$), solid-solid (s-s) phase transition from a hexagonal lattice to a square lattice is observed, suggesting a diffusive nucleation and growth process. We discuss the experimental phase diagram and compare our observations to the theoretical phase diagram for soft dipolar spheres [3].

References

1. J. Brijitta, P. Schurtenberger, *Curr Opin Colloid Interface Sci*, 2019, 40, 87–103.
2. JJ. Crassous, et al., *Nat Commun*, 2014, 5, 1–7.
3. A.-P. Hynninen, M. Dijkstra, *Phys Rev Lett*, 2005, 94, 138303.

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