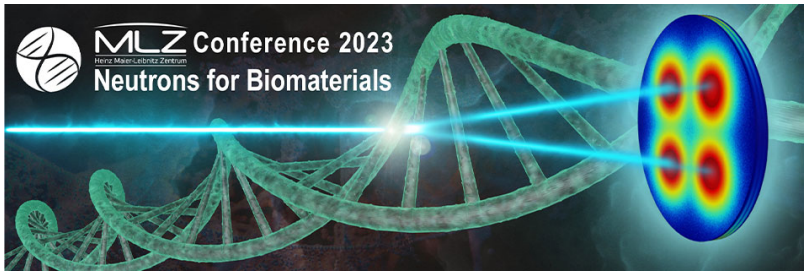

Contribution ID: **23** Type: **Talk**

Coacervation of graft double hydrophilic block polyelectrolyte with oppositely charged surfactant

Tuesday, 23 May 2023 09:10 (20 minutes)

Polyelectrolyte–surfactant (PE–S) complexes have attracted great interest because of their wide industrial applications ranging from cosmetics, detergents, food technology and paints to drug delivery. It is well-known fact that block copolymers consisting of a polyelectrolyte block and a neutral hydrophilic block (double hydrophilic block polyelectrolytes, DHBP) co-assemble in aqueous solutions with oppositely charged ionic surfactants in core-shell nanoparticles which have cores formed by water-insoluble polyelectrolyte-surfactant complex. Such complexes can form a number of diverse morphologies depending on polyelectrolyte and surfactant chemical composition, on their ratio and on mixing conditions (e.g., spherical or cylindrical micelles and vesicles) in a broad range of sizes. Although, many of the similar systems have been already described in the literature, the detailed knowledge about PE-S complexes based on graft copolymers with polyelectrolyte backbones and neutral hydrophilic grafts is still missing.

In this communication, we investigated the co-assembly of fully-ionized poly(methacrylic acid-co-polyethyleneglycol methacrylate) (PMAA-PEGMA) graft DHBP and oppositely charged cationic surfactant N-dodecylpyridinium chloride (DPCl) in alkaline solution. The results demonstrated the influence of polymer morphology on assembly behavior by revealing that association of graft DHBP differs from that of linear one and from homopolyelectrolytes resulting in formation of micrometer-sized coacervate particles[1]. The investigation was focused on resolving structural and dynamical characteristics of the system combining light, X-ray, neutron scattering with DOSY NMR and neutron spin echo (NSE) experimental techniques. We have shown the formation of two types of DPCl micellar structures forming the PE-S complex with PMAA-PEGMA chains in the system: (i) small elongated micellar aggregates with fast diffusion and (ii) large aggregates of densely packed micelles with a slow diffusion, presented only in coacervate phase[2].

References:
1. Fanova et al. Macromolecules 52(16), 6303 (2019).
2. Fanova et al. Macromolecules 55(14), 6191 (2022).

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Session Classification: Peptides, polymers and gels

Track Classification: Peptides, polymers and gels