

Molecular analysis of metallo-supramolecular systems by molecular hydrodynamics approaches

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A promising approach in today's polymer chemistry is the conjunction of covalent linked polymer species with non-covalent interactions to establish new polymeric systems. For this purpose, supramolecular polymers containing reversible metal–ligand interactions have been widely studied in the past decades. However, in spite of the strong attention on such polymer systems their detailed molecular analysis in solution remains scarce. In the here presented study the attention is focused on the detailed macromolecular analysis of differently structured copolymers embedding terpyridine, ferrocene and bidentate-(triazol-4-yl) pyridine units by the complementary methods of molecular hydrodynamics namely analytical ultracentrifugation (AUC), viscosity and dynamic light scattering. The intercorrelation of obtained results was evaluated via the concept of the hydrodynamic invariants.

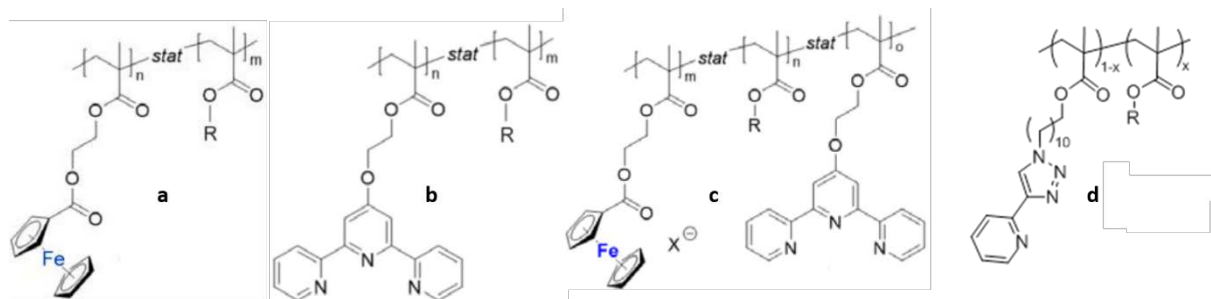


Figure 1. Chemical structures of the studied systems with ferrocene (a), terpyridine (b), ferrocene and terpyridine (d), and bidentate 2-(1,2,3-Triazol-4-yl)pyridine units in the side chains.

The copolymers were synthesized using the controlled radical addition-fragmentation transfer (RAFT) polymerization technique. Subsequently the macromolecules were treated with Pt³⁺, Co²⁺, Fe²⁺, and Eu³⁺ metal ions. The special attention was paid to the investigation of the intra- and inter molecular complexation behavior of the metal ions with the ligand containing methacrylate copolymers at different conditions by the sedimentation velocity analysis applying modern approaches for the AUC data treatment.

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