RAFT POLYMERIZATION AS AN INSTRUMENT FOR CONTROLLED SYNTHESIS OF AMPHIPHILIC COPOLYMERS: POLYMERIZATION INDUCED SELF-ASSEMBLY VERSUS CONVENTIONAL SOLUTION POLYMERIZATION

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The growing progress in the development of the processes of reversible deactivation radical polymerization (RDRP) led to creation of new smart polymers with well-defined chain architectures. Among them, amphiphilic copolymers, and in particular block copolymers, causes particular interest due to ability to spontaneous self-assembly with formation of different nanostructures. The type of nanostructure and the capability to respond to external physical or chemical stimuli depends on chemical structure of the chain, monomer unit distribution and chain length. All these parameters may be tuned in the course of RDRP. Among RDPR techniques, the RAFT processes have certain advantages, including resistance to the functional groups of monomers and a broad range of solvents and temperature intervals. These advantages provide the possibility to direct synthesis of amphiphilic copolymers both in organic and aqueous media.

The solution technique of controlled synthesis of amphiphilic block copolymers requires the choice of appropriate solvent, RAFT agent and the sequence of the monomer addition in the polymerization. The change in thermodynamic quality of the solvent during polymerization in this case may cause violation of the living mechanism. The typical examples of such kind of the synthesis using polyacrylic acid and its copolymers bearing trithiocarbonate group will be discussed [1–3].

The second approach basing on various types of heterophase polymerization (dispersion, emulsion, and miniemulsion) may lead to self-assembly of the amphiphilic block copolymers directly in the course of RAFT polymerization [4]. As a result, the dispersions of "core–shell" particles of different morphology are formed. The stability of the synthesized dispersions, control over particles morphology and molecular mass characteristics of the resulted block copolymers governed by the range of parameters will be discussed in details [1–3].

The advantages and disadvantages of both techniques will be considered.

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