

## Nanocomposites and nanomaterials

### Synthesis and properties of amphiphilic block polymers with F- and PEG-contained side chains

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Novel surface active polymers with controlled length of hydrophilic and hydrophobic blocks as well as F- and PEG-contained side chains were constructed. Novel polymers with suggested structures (fig. 1) were synthesized according to the developed approach that consists of two stages.



Fig. 1. Structure of synthesized polymers

Comb-like prepolymers with terminal peroxide groups were obtained via radical polymerization of appropriate macromers (F-alkyl methacrylate or PEG methacrylate) in presence of peroxide-contained chain transfer agent. Initially obtained comb-like prepolymers were used as macro-initiators of radical polymerization initiated by terminal peroxide groups. Polymers with different length of hydrophilic and hydrophobic blocks, their ratio, length of side chains and colloidal properties consequently were synthesized. Kinetic peculiarities of every polymerization step and content of polymers were studied. Structure of polymers was confirmed by IR- and NMR-spectroscopy, molecular-weight parameters were determined by GPC analysis. Combination of blocks and combs of different nature assured surface activity of polymers and their ability to form direct and reverse micelle-like structures (MLS) with various architecture and sizes. Intermolecular self-organization and formation namely MLS was indicated by isotherms of surface tension of polymer water solutions, possibility to solubilize water-soluble and organic-soluble dyes, and results of TEM and DLS measurements.

Thus, due to their special structural features, obtained polymers were considered as prospective carriers of bio-active compounds, could serve as thermo-responsive materials (in case of polymers with PEG methacrylate side chains) or as labels for detection of biological objects (in case of F-contained polymers).