RAFT-MEDIATED EMULSION OR DISPERSION POLYMERIZATION. A DIRECT WAY TOWARD SELF-ASSEMBLED AMPHIPHILIC BLOCK COPOLYMERS

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ABSTRACT

Amphiphilic block copolymers are of high interest for many applications, such as compatibilizers, stabilizers or self-assembled core-shell structures used for instance as nano-carriers or nano-containers. For their synthesis, controlled/living free-radical polymerization methods (the so-called radical polymerizations via reversible deactivation of the propagating radicals) are particularly suited due to their compatibility with a variety of functional groups. Most of the time, synthesis is performed in an organic solvent, in which both blocks are equally soluble. Then, when needed, the assembly process is performed in water, generally assisted by an organic co-solvent. To simplify the synthesis procedure and limit the use of volatile organic compounds, we proposed a method based on aqueous emulsion or dispersion polymerization, by which a water-soluble living polymer is directly chain extended in the aqueous medium to form an amphiphilic block copolymer in situ. The latter self-assembles during the growth step, which leads to amphiphilic core-shell morphologies, from spherical micelles to nanofibers and vesicles. The presentation will describe the use of the RAFT (reversible addition-fragmentation chain transfer) technique and will discuss various parameters that affect the kinetics, the control over copolymer architecture and the final nano-object morphologies.

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