SEPARATION OF COMPLEX BRANCHED POLYMER ARCHITECTURES

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Amphiphilic polymers are combining opposite properties in one molecule and can lead to materials with unusual characteristics. As unimolecular micelles, additionally, they could be used in nanostructures possessing interesting anti-biofouling abilities, atypical sequestration, and special mechanical applications or can be used as carrier for guest molecules for drug release. In the last years progressive approach for synthesis of core-shell amphiphilic polymers have been developed using well-accessible hyperbranched (hb) polymers. They exhibit dense molecular structure and a big number of reactive end functionalities, which could be modified arbitrarily with different long chains leading to hyperbranched stars. However, the combination of two effects – the broadly distributed and very complex branched structure together with the amphiphilic character makes the characterization of these species a challenging task. In this work, the separation and characterization of different types of hb structures and hb stars has been performed. Size exclusion chromatography combined with static and dynamic light scattering has been applied to investigate hyperbranched polyesters and polystyrenes with polyoxazoline arms. Polyethyleneimine with polypeptide arms as bio-compatible, bio-degradable polymers exhibiting pH-sensitive phase-transfer behavior for triggering encapsulation and release of guest molecules, have been characterized by SEC-MALLS and aqueous AF4.