

## SELF-ASSEMBLY IN BLOCK COPOLYMER SYSTEMS

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Microphase separated ABC triblock copolymers show a huge variety of morphologies. After a short introduction, the synthesis of both ternary linear and star copolymers will be described, before two questions concerning the morphological behaviour of such systems will be discussed:

- How does the chain topology influence the morphological behaviour of ABC triblock copolymers?
- How does blending of ABC triblock copolymers with other block copolymers affect their morphological properties?

The influence of the block sequence in linear triblock copolymers will be discussed on examples of triblock copolymers based on polystyrene (S), polybutadiene (B), poly(methyl methacrylate) (M) and poly(2-vinylpyridine) (V), SBM, BSM and SBV, BSV, respectively. It will be shown that the relative interfacial tensions between adjacent blocks play an important role in their morphological behaviour. On the example of SBV heteroarm star terpolymers, the significantly different morphological behaviour of this type of terpolymer as compared to linear triblock copolymers will be discussed.

Blends of SBM or SBT (T: poly(tert-butyl methacrylate) ) triblock copolymers with other diblock or triblock copolymers give access to a number of morphologies known from triblock copolymers (but at different overall compositions) and to some new morphologies which are unknown for triblock copolymers. Here only blends will be presented, where chemically similar blocks form common microdomains in mixed superlattices. Besides formation of core-shell analogues of the known diblock copolymer morphologies spheres, cylinders, double gyroids and lamellae also periodic non-centrosymmetric lamellae, the knitting-pattern morphology and other morphologies are accessible. The formation of these microphase separated superlattices of different block copolymers is controlled by changes of the conformational entropies of the different blocks, which lead to an overall decrease of the stretching energy contribution and reduce the free energy of the system as compared to macrophase separated pure domains of the different block copolymers.