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ABC TRIBLOCK COPOLYMERS WITH CRYSTALLINE END BLOCKS

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Classical thermoplastic elastomers are ABA triblock copolymers, with the A-block consisting of polystyrene whereas the B-block is typically polybutadiene or polyisoprene (PS-*b*-PB-*b*-PS or PS-*b*-PI-*b*-PS). Due to the incompatibility of these blocks, a microphase separation occurs whereby the polystyrene, being the minority phase, forms dispersed spheres or cylinders in a rubbery matrix of the middle block. There have been several investigations about the ratio of middle block chains which start and end in the same hard block domain (loops) or connect different domains (bridges). While the bridges contribute to the elastic properties of the material, the loops in general do not but decrease the elastic modulus. ABC triblock copolymers offer the ability to build thermoplastic elastomers without any loops, if the incompatibility between the end blocks is strong enough. For amorphous systems in general a sufficient high molecular weight is necessary to achieve a high immiscibility of the A- and C-blocks which on the other hand is a disadvantage in view of processing (injection molding, etc.). A way to achieve high incompatibility at low molecular weights is to use semicrystalline end blocks, since crystallization is a strong driving force for microphase separation. Our approach to overcome the loop formation is the use of ABC triblock copolymers with one or two semicrystalline end blocks. In this contribution we will compare our results on polystyrene-*b*-poly(ethylene-*alt*-propylene)-*b*-polyethylene (PS-*b*-PEP-*b*-PE) with polystyrene-*b*-poly(ethylene-*alt*-propylene)-*b*-polystyrene (PS-*b*-PEP-*b*-PS) triblock copolymers. Moreover, ternary triblock copolymers containing two crystalline end blocks will be presented. On the example of polyethylene-*b*-poly(ethylene-*alt*-propylene)-*b*-poly(ethylene oxide) (PE-*b*-PEP-*b*-PEO) and its precursor, polybutadiene-*b*-polyisoprene-*b*-poly(ethylene oxide) the influence of different factors on the crystallization will be discussed.