Preparation of nano-sized particles for improved toughness

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Introduction
For brittle amorphous polymers, a maximum toughness and a minimum loss in stiffness can be obtained by using easy cavitating nano-sized modifiers. The self-assembly process of diblock-copolymers in micelles can be used to prepare such systems [1]. These micellar structures should be formed in monomers, like styrene or methyl methacrylate (MMA), which after polymerisation form the continuous phase.

Material preparation
The diblock-copolymers were synthesized by the Atom Transfer Radical Polymerisation of methylacrylate (MA) and butylacrylate (BA) using hydrogenated poly(butadiene) (PB) (M_n=4800 g/mol) macroinitiators.

Results
Diblock copolymers were synthesized with a M_n of 10000, M_w/M_n ~ 1.10 and lamellar bulk morphology.

Conclusion
The proposed nano-sized morphology can be made by the introduction of hydrogen bonding between matrix and shell material.

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References