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Domain bridging in melts of starblock copolymers

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Block copolymers that form thermoplastic elastomers have some blocks that form glassy domains and other elastic blocks that bind the glassy domains together, leading to strong, and yet elastic materials. Binding glassy domains requires molecular bridges between domains, with the greatest number of molecules bridging between domains being the most desirable. Starblock copolymers have several glassy end blocks and therefore a high potential to enter multiple domains. We investigate bridging fractions and other statistical properties of starblock arms using self-consistent field theory. For 9-arm stars, the fraction of stars that bridge domains can exceed 99.9% - far above bridging fractions found for triblocks or linear multiblocks. High bridging fractions, combined with the ability for a single molecule to bridge more than two domains makes starblock copolymers an excellent candidate for strong thermoplastic elastomers.

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