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Soft and Strong Thermoplastic Elastomers Through Molecular Design FOLUSHO OYEROKUN, GLENN FREDRICKSON, UCSB, DALE HANDLIN, Kraton Polymers — Thermoplastic elastomers (TPE) that have a low linear modulus and yet are strong at large extension are of great importance in a variety of technological applications. Current TPE designs based on ABA triblock copolymers are limited in that the maximum volume fraction of the hard A blocks, which correlates with the material strength, is restricted by the constraint that the A domains be discrete while the soft B domains are continuous. In this study, we have investigated new designs of TPEs that utilize polydispersity of the hard blocks in tandem with novel block architectures to control morphology in microphase separated AB block copolymers. Self-consistent field theory calculations confirm that these designs stabilize spherical and cylindrical phases at higher volume fractions of the hard blocks, with the maximum volume fraction of the hard block in some cases approaching twice that of a conventional ABA thermoplastic elastomer.

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