

Abstract Submitted
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Effects of Gradient Sequencing in Copolymers for Unusual, Tunable Properties and Phase Behavior MICHELLE MOK, JOHN TORKELSON, Northwestern University — The sequencing of comonomers in gradient copolymers provides a novel, additional degree of freedom for controlling copolymer properties and phase behavior. With gradient copolymers of moderate segregation strength, we demonstrate that it is possible to substantially tune the glass transition temperature breadth through gradient sequence design. Transition breadths from 54 to 101 °C were achieved and these changes were correlated directly to predictions of composition variation from self-consistent mean-field theory. We also explore the influence of comonomer sequence on phase behavior using melt rheology, verifying the high level of temperature sensitivity predicted by theory; a gradual change from solid-like to liquid-like behavior was observed over a temperature range of 80 °C. Finally, experiments also expose a rare combination of upper and lower critical ordering transitions in gradient copolymers which are unattainable in block copolymers of the same system, demonstrating the potential for more complex phase diagrams through gradient sequencing.

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