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Thermodynamics of coil-hyperbranched poly(styrene-b-acrylated epoxidized soybean oil) block copolymers. FANG-YI LIN, AUSTIN HOHMANN, NACÚ HERNÁNDEZ, ERIC COCHRAN, Iowa State University — Here we present the phase behavior of a new type of coil-hyperbranched diblock copolymer: poly(styrene-*b*-acrylated epoxidized soybean oil), or PS-PAESO. PS-PAESO is an example of a biorenewable thermoplastic elastomer (bio-TPE). To date, we have shown that bio-TPEs can be economical commercial substitutes for their petrochemically derived analogues—such as poly(styrene-*b*-butadiene-*b*-styrene) (SBS)—in a range of applications including pressure sensitive adhesives and bitumen modification. From a polymer physics perspective, PS-PAESO is an interesting material in that it couples a linear coil-like block with a highly branched block. Thus in contrast to the past five decades of studies on linear AB diblock copolymers, coil-hyperbranched block copolymers are relatively unknown to the community and can be expected to deviate substantially from the standard "universal" phase behavior in the AB systems. To explore these new materials, we have constructed a library of PS-PAESO materials spanning a range of molecular weight and composition values. The phase transition behavior and the morphology information will be interpreted by isochronal temperature scanning in dynamic shear rheology, small angle X-ray scattering and the corresponding transmission electron microscopy.

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