

Abstract Submitted
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Properties of polystyrene/poly(dimethyl siloxane) blends partially compatibilized with star polymers containing a gamma-cyclodextrin core and polystyrene arms C. MAURICE BALIK, North Carolina State University, BRAD J. BUSCHE, Pacific Northwest National Lab, ALAN E. TONELLI, North Carolina State University — Cyclodextrins (CDs) are cyclic starch molecules having a hollow central cavity which can be threaded by a polymer to form an inclusion compound. This characteristic is exploited in a new type of compatibilizer: a star polymer with a gamma-CD (g-CD) core and polystyrene (PS) arms (CD-star). Spun-cast thin films of PS containing up to 20 weight percent poly(dimethyl siloxane) (PDMS) are compatibilized by CD-star. The mechanism of compatibilization involves threading of the CD core by PDMS and solubilization of the resulting slip-ring graft copolymer via the PS star arms. Thin spun-cast films of these blends exhibit a nanoscale level of mixing and remain well-mixed after annealing at 125 C for three days. In contrast, thicker solution-cast films of these blends exhibit larger-scale phase separation since the film solidification process occurs over a period of days rather than seconds. This allows some of the PDMS to de-thread from the CD-star and phase separate. However, DSC, DMA and PDMS leaching data show that PS and PDMS remain partially compatibilized in the solution-cast films.

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