

Abstract Submitted
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Compatibilization of polymer blends with star polymers containing a gamma-cyclodextrin core and polystyrene arms¹ C.M. BALIK, Dept. of Materials Science and Engineering, North Carolina State University, A.E. TONELLI, Dept. of Textile Engineering, Chemistry and Science, North Carolina State University, RYAN LIBERT, Dept. of Materials Science and Engineering, 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). The mechanism of compatibilization involves threading of the CD core by a second polymer and solubilization of the threading polymer into a PS matrix by the PS star arms. In principle, the same CD-star polymer can be used to compatibilize blends of several different polymers with PS, provided that the second polymer is able to thread the CD core. We have taken the first step toward demonstrating the generality of this approach by producing compatibilized blends of PS with poly(dimethyl siloxane) (PDMS) or poly(methyl methacrylate) (PMMA) using the same CD-star polymer. Thin spun-cast films of these blends exhibit a nanoscale level of mixing, while spun-cast films of the same blends without CD-star exhibit large-scale phase separation. The number of CD-star molecules that must be threaded onto the polymer chain to achieve compatibilization is larger for PMMA than for PDMS.

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