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Bottlebrush Polymer Additives for Binary Polymer Blends HUI ZHEN MAH, PANTEA AFZALI, HANH PHAN, University of Houston, LUQING QI, STACY PESEK, RAFAEL VERDUZCO, Rice University, GILA STEIN, University of Houston — Bottlebrush polymers are highly branched polymers that have been used in applications such as self-assembling photonics, drug delivery and stimuli-responsive surface coatings. However, they have not been widely studied as compatibilizers for polymer blends. In this study, bottlebrush polymers with poly(styrene-r-methyl methacrylate) side chains were used as additives for thin film blends of polystyrene (PS) and poly (methyl methacrylate) (PMMA). The blends were heated above the glass transition temperature to drive phase separation, and the resulting morphology was characterized with atomic force microscopy and optical microscopy. Outcomes were compared with PS/PMMA blends that contain conventional compatibilizers such as linear random copolymers of poly(styrene-r-methyl methacrylate) and diblock PS-PMMA copolymers. The bottlebrush additive accumulates at the PS/PMMA interface and drives the formation of vesicle-like droplets that assemble into longer chains. The continuity of the chains depends on the blend composition, where a network structure is achieved close to the critical composition. This unusual microstructure was not observed with the other additives, and may be a consequence of preferential wetting of the bottlebrush by the PS phase.

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