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Controlling the morphology of immiscible polymer blends using bottlebrush random copolymers HUIZHEN (ADELINE) MAH, PANTEA AFZALI, University of Houston, LUQING QI, STACY PESEK, RAFAEL VERDUZCO, Rice University, GILA STEIN, University of Tennessee, Knoxville — Bottlebrush polymers are highly branched macromolecules with polymeric side-chains attached to a linear backbone. The functionality and properties of the bottlebrush is controlled by the side-chain composition, side-chain length, and backbone length. In this study, we investigate the thin film phase behavior of a ternary blend system consisting of polystyrene (PS) and poly (methyl methacrylate) with 20 wt% of a bottlebrush poly (styrene-r-methyl methacrylate) additive. The blend morphologies were characterized using atomic force microscopy and optical microscopy. We find that bottlebrush poly (styrene-r-methyl methacrylate) additives having 50-60 mol% styrene are soluble in the PS phase, reaching a concentration of 20 vol%, but limited miscibility with PMMA can drive the formation of a PMMA/bottlebrush interphase. This interphase inhibits the coarsening of microstructures while forming a co-continuous network.

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