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Computational and Experimental Investigation of Morphology of Polymer Gels YELENA SLIOZBERG, KENNETH STRAWHECKER, JAN ANDZELM, JOSEPH LENHART, U. S. Army Research Laboratory — Thermoreversible polymer gels based on block copolymers represent a remarkable class of materials for a wide range of applications. An efficient approach to control and modify the properties of these gels is to use multicomponent mixtures of self-assembling block copolymers differing in architecture, length and chemical nature. As a result of microphase separation, "mixed" or "pure" micelles, containing block copolymers of the same or different types, are developed. Here, we present a dissipative particle dynamics (DPD) study of the morphology of a binary mixture of AB/ABA block copolymers differing in length of the insoluble blocks in B-selective solvent. We have observed numerous morphologies of AB/ABA blends, which are characterized by formation of pure and mixed micelles of various compositions, structures and sizes. We have discovered that changing the copolymer ratio and processing conditions impacts morphology of these blends. Finally, we have established factors that affect an intermicellar distance and a bridge fraction which ultimately determines the mechanical properties of the gels. Results of our computations were compared with our experimental findings based on atomic force microscopy and the other experimental and theoretical studies and demonstrated a good agreement.

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