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RHEOLOGY AND MORPHOLOGY OF IMMISCIBLE POLYMER BLENDS STABILIZED WITH PARTICLES

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In this study, the effect of micron-sized calcium carbonate particles and the role of its size on the stabilization of Polydimethylsiloxane (PDMS)/polyisobutylene (PIB) blends, as a model system, were investigated. The presence of particles in the fluid-fluid interface has been verified by optical microscopy and thermodynamic approach. Moreover, direct visualizations showed that the particles are able to form a cluster of droplets by simultaneously adsorbing two fluid-fluid interfaces and glue droplets together. These particle-bridged droplet clusters lead to a plateau in storage modulus and upturn in complex viscosity in low frequency during frequency sweep experiment. In this study, beside frequency sweep and recovery tests, relaxation modulus experiment has been used to investigate the effect of presence of particles on the flow-induced coalescence phenomenon in this system. These results showed that upon the addition of particles, flow induced coalescence was slowed down and in 4 w% particles totally suppressed this phenomenon. This effect became more obvious when the particle size was reduced. Relaxation experiments under quiescent conditions showed that the bridging is more effective than the coalescence therefore rheology of this system has been controlled by the bridging of droplets.