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Effect of Encapsulated Polymers and Nanoparticles on Deformation of Droplets O. BERK USTA, University of Pittsburgh, DENNIS PERCHAK, Kodak US Research, ANDREW CLARKE, Kodak European Research, JULIA M. YEOMANS, Oxford University, ANNA C. BALAZS, University of Pittsburgh — We investigate the effects of polymer chains and nanoparticles on the deformation of a droplet in shear and extensional flow using computational modeling; Our model accounts for both the solid and fluid phases explicitly. We show that under shear flow, both the nanoparticles and the encapsulated polymers reduce the shear-induced deformation of the droplet at intermediate capillary numbers; nevertheless, long polymer chains can induce the breakup of the droplet at high capillary numbers. In contrast, under extensional flow we find that the long polymer chains inhibit the breakup and reduce deformation. We study the chain-length and concentration dependence and also present the effects of various parameters such as the wetting strength.

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