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Rich Janus Colloid Phase Behavior Under Steady Shear RONAL A. DELACRUZ-ARAUJO, Department of Chemical Engineering, University of Puerto Rico–Mayagüez, Mayagüez, PR 00681, USA, DANIEL J. BELTRAN-VILLEGAS, RONALD G. LARSON, Department of Chemical Engineering, University of Michigan, Ann Arbor, MI 48109, USA, UBALDO M. CÓRDOVA-FIGUEROA, Department of Chemical Engineering, University of Puerto Rico–Mayagüez, Mayagüez, PR 00681, USA — We study the assembly of single-patch Janus colloids under steady shear via Brownian dynamic simulations. Under quiescent conditions, varying the patch size, the range, and strength of the interaction potential we observe different aggregates such as micelles, wormlike clusters, vesicles and lamellae. Under shear conditions we observe rearrangement, deformation, and break-up of aggregates. At large Péclet (Pe) numbers the shear forces dominate over Brownian forces and aggregates dissociate in a gas for all structures studied. At small and intermediate Pe, the competition between rearrangement, deformation, and break-up favors the growth of micelles and vesicles with Pe, resulting in mean cluster size increases, consistent with a previous study of Janus particles under shear. After the initial shear-induced growth, micelles and vesicles dissociate into a gas. Wormlike aggregates initially break-up into micelles, and proceed to finally reach a gas phase. Lamellar structures initially break into smaller lamellae that align with the flow direction and finally dissociate into a gas. This work opens new actuation routes for re-configurable materials and applications where different types of aggregates will be present under quiescent conditions while others will form under shear.

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