Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Self-Assembly of Janus Colloids under Flow[1] ARASH NIKOUBASHMAN, Johannes Gutenberg University Mainz — Functionalized colloids have attracted an increasing amount of attention due to their inherent capacity to self-assemble into complex hierarchical structures, such as micelles, vesicles, or lamellar phases. The majority of previous studies has focused on the equilibrium behavior of these systems in the bulk, where self-assembly occurs as the result of the interplay between the particle interactions and diffusive transport. However, equilibrium is often never reached in many biological and physical systems due to external fields or dynamic arrest. To study these non-equilibrium situations, we performed molecular dynamics simulations of Janus colloids under flow. At rest, the Janus colloids spontaneously assembled into spherical micelles. Under strong shear, they broke up into smaller fragments and isolated particles. Nonetheless, an intermediate shear rate regime was found where the growth of the micelles was favored. The simulations revealed that clusters composed of either 6 or 13 particles were most stable towards shear due to the high geometric symmetry of these aggregates. Furthermore, a sizable fraction of free particles and small clusters with 3 and 4 members was found at the walls when the channel was made out of a comparably solvophobic material as the colloids.

[1]German Research Foundation (DFG), Project No. NI 1487/2-1

Arash Nikoubashman
Johannes Gutenberg University Mainz

Date submitted: 01 Nov 2016 Electronic form version 1.4