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Self-Driven Droplet Powered By Active Nematics TONG GAO, Michigan State University, ZHAORUI LI, Texas AM University-Corpus Christi, MICHAEL SHELLEY, Courant Institute of Mathematical Sciences — Active matter defines a class of emerging bio-inspired materials composed of self-driven microparticles and far away from equilibrium. Their anormalous physical properties and the means to control them, suggest novel methods in mixing/separation, micropumps and motors, self-healing materials etc. The possibility of realizing these applications hinges on a through understanding of the physical mechanisms as well as developing means to manipulate various active systems. By using of a coarse-grained active liquid crystal model, we design and investigate self-driven droplets encapsulating a dense suspension of active particles. We show that a single droplet can be set into motion due to the internal collective motions that are featured by active flows and motile disclination defects. We illustrate that the interplays between the induced directional flows, liquid crystalline structures, and the deformable interface with surface tension can result in tunable mobilities of motile droplets that undergo novel locomotion and rotation.

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