Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Thermo-responsive cross-linked liquid crystal bowl-shaped colloids[1] WEI-SHAO WEI, University of Pennsylvania, Department of Physics and Astronomy, YU XIA, SHU YANG, University of Pennsylvania, Department of Materials Science and Engineering, A. G. YODH, University of Pennsylvania, Department of Physics and Astronomy — In this work we create and investigate cross-linked bowl-shaped nematic liquid crystal (NLC) colloidal particles. Janus colloids are first formed via solvent-induced phase separation in emulsions consisting of NLC monomers and isotropic polymers. This scheme enables us to realize different particle morphologies such as bowl-shape by fine-tuning the confinement of NLCs within the droplets, e.g. by varying the size of droplets, the volume ratio between NLC and polymer, and the type/concentration of surfactants in aqueous background phase. The NLC compartment is composed of RM82 (1,4-Bis-[4-(6-acryloyloxyhexyloxy)benzoyloxy]-2-methylbenzene) monomers, which are then photocrosslinked by dithiol groups to form nematic liquid crystal elastomer. Finally, we remove the polymer parts of Janus colloids to obtain the target structures, which are temperature sensitive due to change of elasticity and molecular alignment of NLC near the isotropic to nematic phase transition temperature. We will explore novel mechanical and optical properties from the thermo-responsive structures as well as their applications, such as biomimic swimming behaviors and adjustable lensing effects.

[1]This work is supported by the foundation through NSF Grant DMR12-05463, NSF-MRSEC Grant DMR11-20901, and NASA Grant NNX08AO0G.

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Date submitted: 06 Nov 2015 Electronic form version 1.4