

Smart Molecular-Spring Photonic Droplet and Shell

Soo-Young Park*, Kyung-Kyu Noh, Jong-Gyu Kim, Dan-Bi Myung, Sundas Munir,
Khuong H. D. Luu, and Dong-Hyun Yeo

Department of Polymer Science & Engineering, Polymeric Nanomaterials Laboratory, School of Applied Chemical Engineering, Kyungpook National University, 80 Daehak-ro, Buk-gu, 41566 Daegu (KR)

Complete solid-state cholesteric liquid crystal (CLC_{solid}) droplets and shells are fabricated using microfluidics after UV curing and chiral-dopant extraction of monodispersed CLC droplets, which consist of a reactive nematic LC mesogen mixture and a nonreactive chiral dopant [1, 2]. The helical pitch of the CLC_{solid} droplet and shell is reduced by removing the chiral dopant in proportion to the extracted volume. The CLC_{solid} droplet and shell exhibits a coloured reflection spot at the centre, with cross-communication dots and central concentric rings. These photonic colours indicate that the helical photonic CLC structure is well-maintained even after UV curing and dopant extraction. The pitch of the well-defined helical photonic structure depends on the solvent quality, temperature, and humidity, giving rise to a reversible change of the reflection colour of the CLC_{solid} droplet and shell under external stimuli. The CLC_{solid} droplets and shells are extremely stable for a long time, even in a good solvent. This smart solid-state molecular-spring photonic droplet eliminates the obstacles to CLC-droplet application caused by the fluidic LC state, and thus introduces a new avenue for CLC applications.

References

- [1] K. G. Noh, and S. Y. Park, *Materials Horizons* **4**, 633 (2017).
- [2] J. G. Kim, and S. Y. Park, *Adv. Optical Mater.* **5**, 1700243 (2017).

**Corresponding author e-mail: psy@knu.ac.kr.*