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A change in stripes for cholesteric shells via modulated anchoring[1] LISA TRAN, MAXIM LAVRENTOVICH, University of Pennsylvania, GUILLAUME DUREY, ALEXANDRE DARMON, ESPCI, MARTIN HAASE, Rowan University, NINGWEI LI, DAEYEON LEE, KATHLEEN STEBE, RANDALL KAMIEN, University of Pennsylvania, TERESA LOPEZ-LEON, ESPCI —
Many of the patterns found in biological systems are also found to self-assemble into cholesteric liquid crystal (CLC) systems. In this work, we probe the effect of varying the perpendicular anchoring strength of a CLC that is confined to a spherical shell. The shell geometry gives the confinement and curvature conditions for the formation of a rich array of meta-stable states, revealing an unexplored region between degenerate parallel anchoring and strong perpendicular anchoring. We modulate the anchoring strength in experiments with two methods: by adjusting the surfactant concentration or, interestingly, by varying the temperature. We find two states not previously reported for CLC shells: a Bouligand arches state, where larger, lateral stripes on the shell can be filled with smaller, longitudinal substripes, and a focal conic domain (FCD) state, where thin stripes wrap into at least two, topologically required, double spirals. We use a Landau-de Gennes model of the CLC to simulate the director configurations of these states. This work identifies the Bouligand arches state in CLC shells and builds upon the existing knowledge of cholesteric FCDs, structures that not only have potential for use as intricate, self-assembly blueprints but are pervasive in biological systems.

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