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Flexible cholesteric film with super-reflectivity and high stability based on multi-layer helical structure

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1. Effect of external disturbance on film properties

Figure S1(a)-(b) show the reflection spectra of samples (C1 and C3) versus temperature of proposed multi-layer film (NOA 81 refilled). It can be seen that for both samples, the central wavelength red-shifts around 4 nm when temperature increases from -70 °C to 70 °C (Fig.S1(c)). Fig. S1 (d)-(f) show the relationship of reflection spectrum versus external stress for the film refilled by NOA81. In contrast to temperature, the reflection curve blue-shifts due to shrinkage of polymer network thus reduction of chiral pitch under external stress. We can see that blue-shifts of 12 nm and 4 nm are obtained for red (C1) and blue color (C3), when external stress increases from 0 to 7.84×10^5 Pa, respectively.

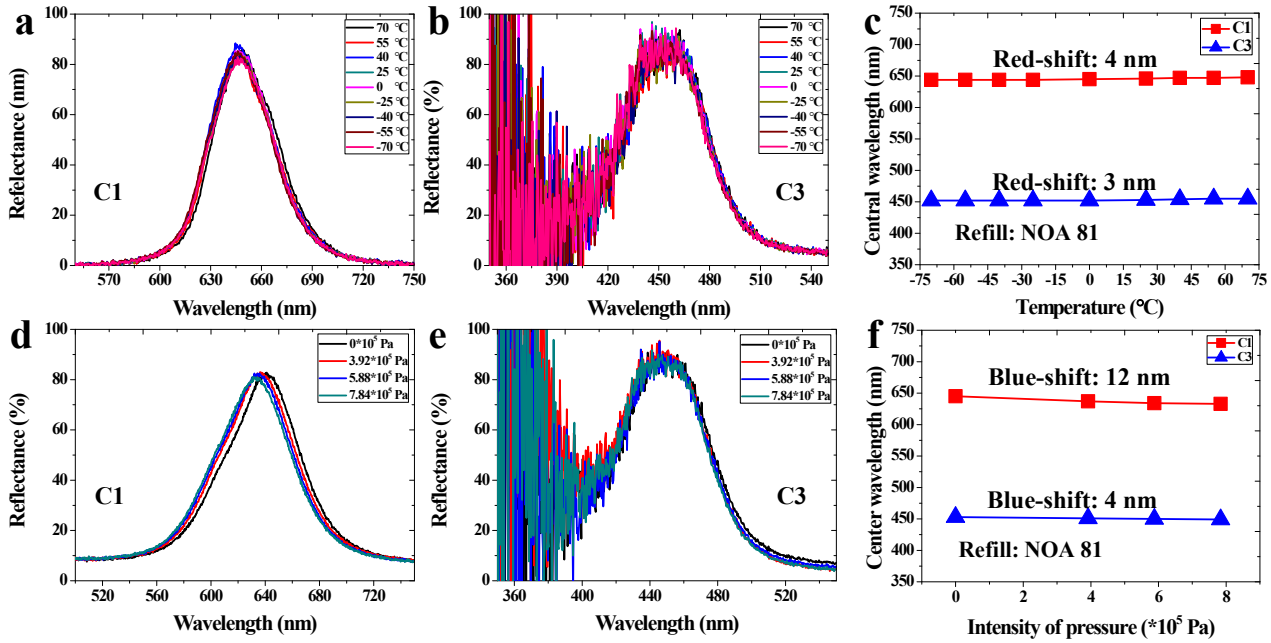

Figure S1. External stimuli effect on films. Temperature effect on spectra of samples **(a)** C1 and **(b)** C3. **(c)** The central wavelength changes versus temperature for samples of C1 and C3. Stress effect on reflectance of **(d)** C1 and **(e)** C3. **(f)** Central wavelength changes versus stress for samples of C1 and C3.

2. The chemical structures of reactive mesogen monomers

In our previous works (Ref. [23]), we has successfully fabricated 1D micro-cavity film using five kind reactive mesogens (RM257, RM82, RM 006, RM021, RM010 are acrylate monomer). Here, the RM257 and RM82 are macromolecules, which can form a polymer network

structure. The RM 006, RM021 and RM010 are small molecules, which can be around the CLC molecules, and holding the helix structure.

The chemical structures of reactive mesogen monomers were showed in the Fig. S2.

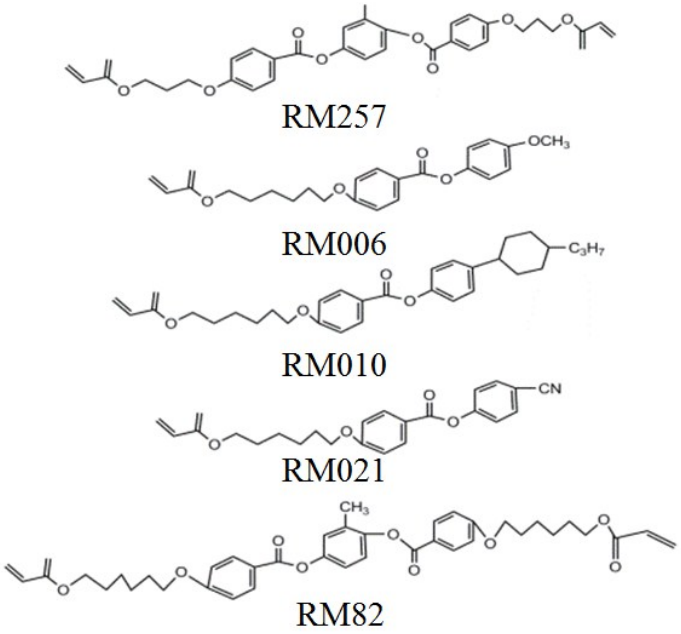

Figure S2. The chemical structures of reactive mesogen monomers.