Supporting information

Preparation and properties of broad-band reflective cholesteric-phase liquid crystal films based on Chiral and non-chiral Bilayers structure

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Experimental Section

In this experiment, the method of orthogonal experiment was adopted to design the experiment, and two groups of orthogonal experiments was designed to investigate the influence of different factors on the reflected wave width, the design of orthogonal experiments of group A and the results are shown in **Table S1**, the orthogonal experiments of group A are carried out to set three levels for the four factors to be investigated, respectively, on the content of HCM021 and C6M, as well as on the time of the polymerization of the N* layer and N layer, and the ultraviolet transmittance spectra and broadband of the samples in group A are shown in **Figure S1**. The optimal content of C6M was determined by the analysis of polar deviation. In the subsequent experiments, 10% of C6M was taken to continue the investigation on the effects of HCM021, the polymerization time of the N* layer, the N layer and the intensity of UV illumination on the reflected broadband $\Delta\lambda$. The design of orthogonal experiments in group B is shown in **Table S2**, and the UV transmittance spectra of the samples in group B and the reflected broadband are shown in **Figure S2**.

K1,K2,K3 is the sum of experimental results obtained at the same level of different factors, **K1,K2,K3** is the mean value obtained by dividing **K1,K2,K3** by the number of levels, and R is the extreme difference between **K1,K2,K3.**

$$R = k_{max} - k_{min} (Equation\ 1)$$

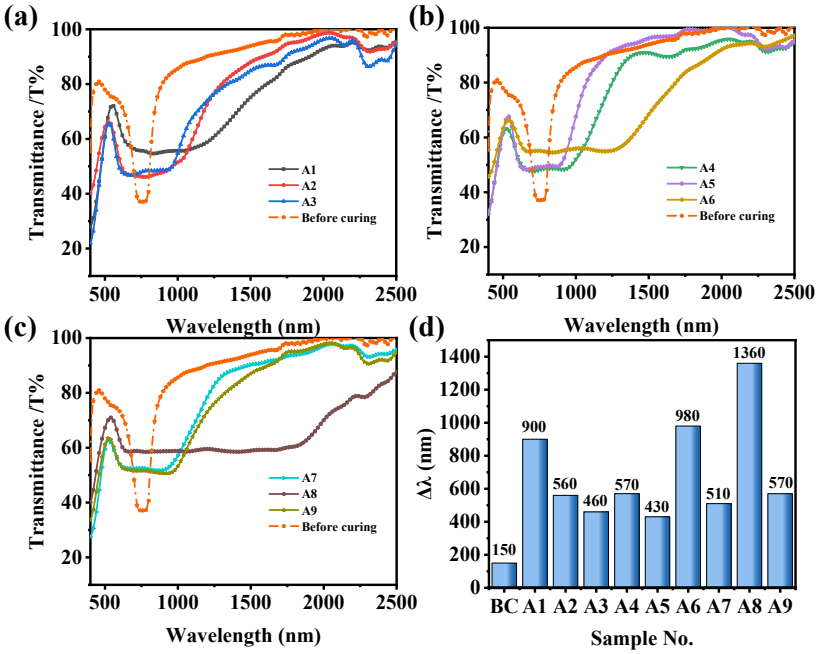

Figure S1. (a)-(c) UV transmission spectra of A1-A9, (d) reflected broadband of A1-A9

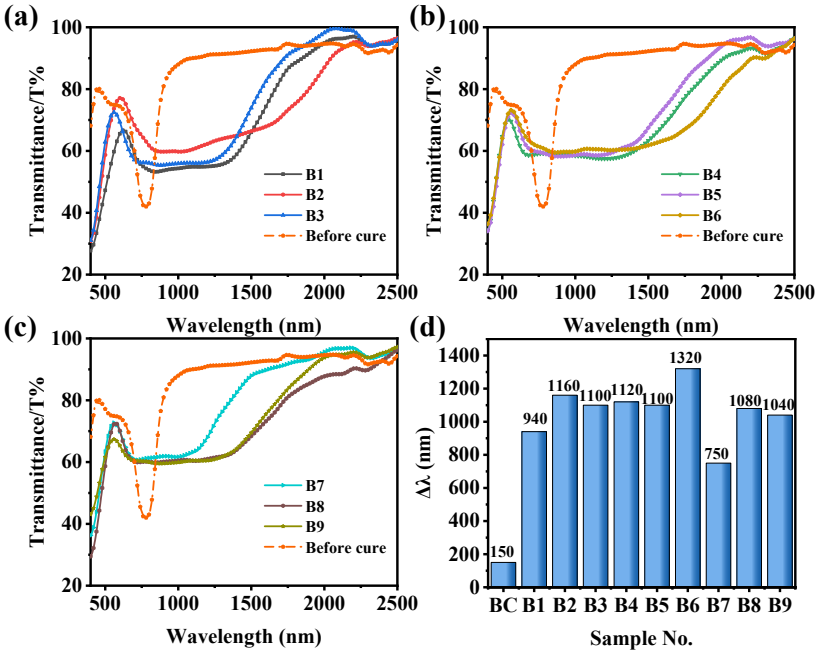

Figure S2. UV transmission spectra of B1-B9, (d) reflected broadband of B1-B9

Table S1.Results of orthogonal experiments in group A

Sample No.	HCM021 (w t%)	C6M (w t%)	N*Polymerization time (min)	N Polymerization time (min)	Δ λ(nm)
A1	10%	5%	7	10	900
A2	10%	10%	9	20	560
A3	10%	15%	11	30	460
A4	15%	5%	9	30	570
A5	15%	10%	11	10	430
A6	15%	15%	7	20	980
A7	20%	5%	11	20	510
A8	20%	10%	7	30	1360
A9	20%	15%	9	10	570
K1	1920	1980	3240	1900	
K2	1980	2350	1700	2050	
K3	2240	2010	1400	2390	
k1	640	660	1080	633	
k2	660	783	566	683	
k3	813	670	466	796	
R	173	123	613	163	

Table S2.Results of orthogonal experiments in group B

Sample No.	HCM021 (w t%)	UV light intensity (mW/cm^2)	N*Polymerization time (min)	N Polymerization time (min)	Δλ(nm)
B1	25%	0.5	6	30	940
B2	25%	0.4	6.5	40	1160
B3	25%	0.3	7	50	1100
B4	30%	0.5	6.5	50	1120
B5	30%	0.4	7	30	1110
B6	30%	0.3	6	40	1320
B7	35%	0.5	7	40	750
B8	35%	0.4	6	50	1080
B9	35%	0.3	6.5	30	1040
K1	3200	2810	3340	3090	
K2	3500	3350	3320	3230	
K3	2870	3460	2960	3300	
k1	1066	936	1113	1030	
k2	1183	1116	1106	1076	
k3	956	1153	986	1100	
R	227	217	127	70	

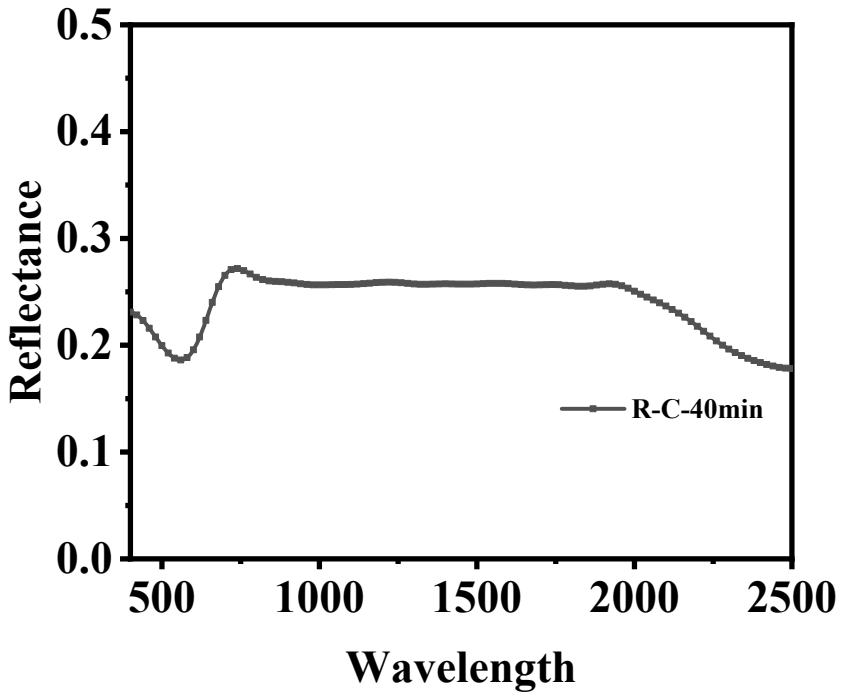

Figure S3. UV reflectance of sample No C

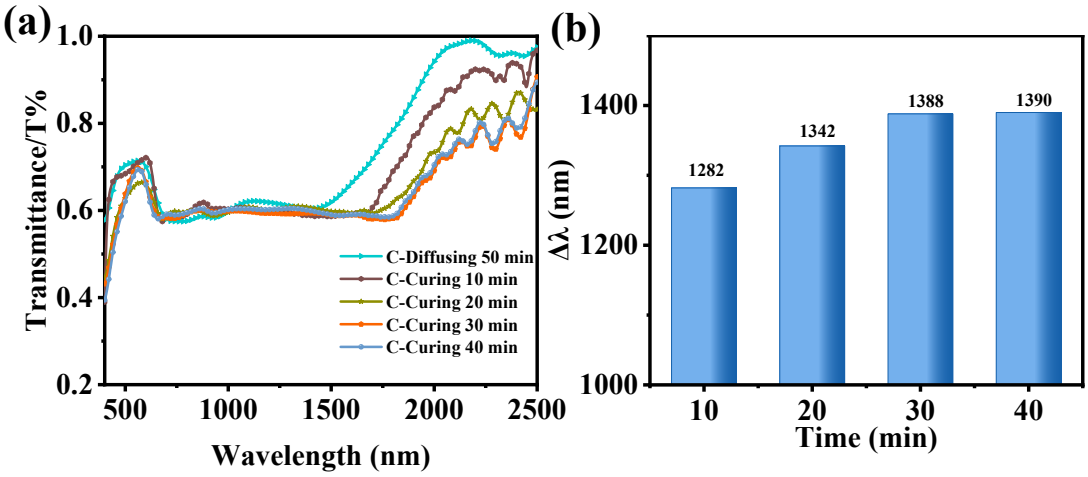

Figure S4 (a) UV spectra of sample C at different times of polymerization after fifty minutes of diffusion, **(b)** reflected broadband of sample C at different times of polymerization after 50 min of diffusion.