Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information

Side-Chain Chiral Fluorescent Liquid Crystal Polymers with Highly Efficient Circularly Polarized Luminescence Emission in the Glassy-State SmC* Film

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Materials. 4-Hydroxybenzaldehyde, 4-hydroxybenzyl, cholesteryl chloroformate, methacrylic acid, 6-bromo-1-hexanol, dibromoalkanes, potassium tert-butylate (KTB), pyridine and DMAP were purchased from Energy Chemical Co., Ltd. K_2CO_3, $KHCO_3$ and KI were obtained from Aladdin. The above materials were directly used without any purification. AIBN initiator was bought from Aladdin and was recrystallized with ethanol before use.

Measurements and Characterizations. ^1H NMR and ^{13}C NMR data were recorded by the NMR spectrometer of Bruker ARX 400 MHz for structural information. The molecular weight of monomers was confirmed using the MALDI-TOF spectrometer of Bruker Biflex III. GPC (Waters 1515) was employed to characterize the number average molecular weight (M_n) and polydispersity index (PDI) of polymers. The TGA Q50 instrument was used to estimate the heat resistance of polymers. The combinatorial tests including polarized light microscopy (PLM), differential scanning calorimeter (DSC, TA Q10), and small angle X-ray scattering (SAXS, BRUKER AXS/D8 X-ray diffractometer) were performed to confirm the polymeric phase structure. The optical properties of polymers were measured by UV-vis (Carry-100) and fluorescence emission spectrometers (PTI Qm40), and their luminous efficiency was measured by Edinburgh fluorescence instruments (FLS980) with an integral accessory. The chiroptical properties of polymers were investigated by circular dichroism (CD, JASCO J-810) and circularly polarized luminescence (CPL, JASCO CPL-300) spectrometer.

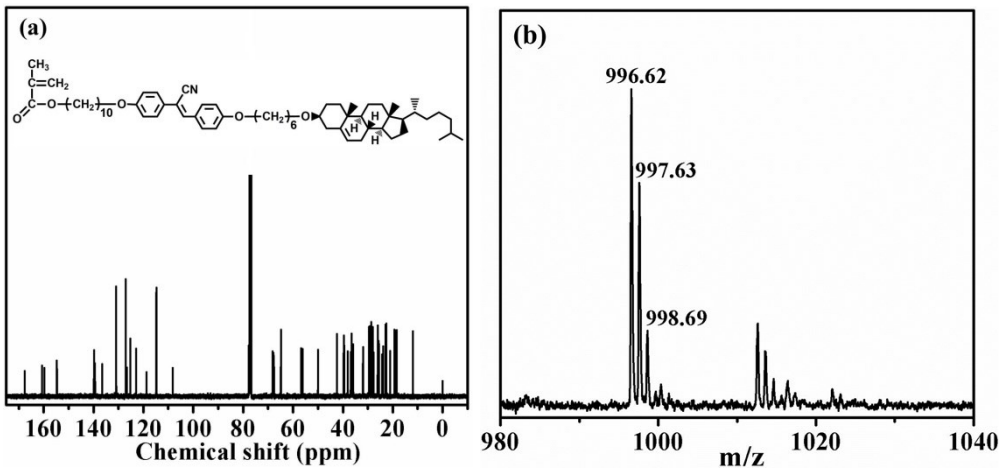

Fig. S1 The ^{13}C NMR spectrum (a) and mass spectrum (b) of MC10CSChol in $CDCl_3$.

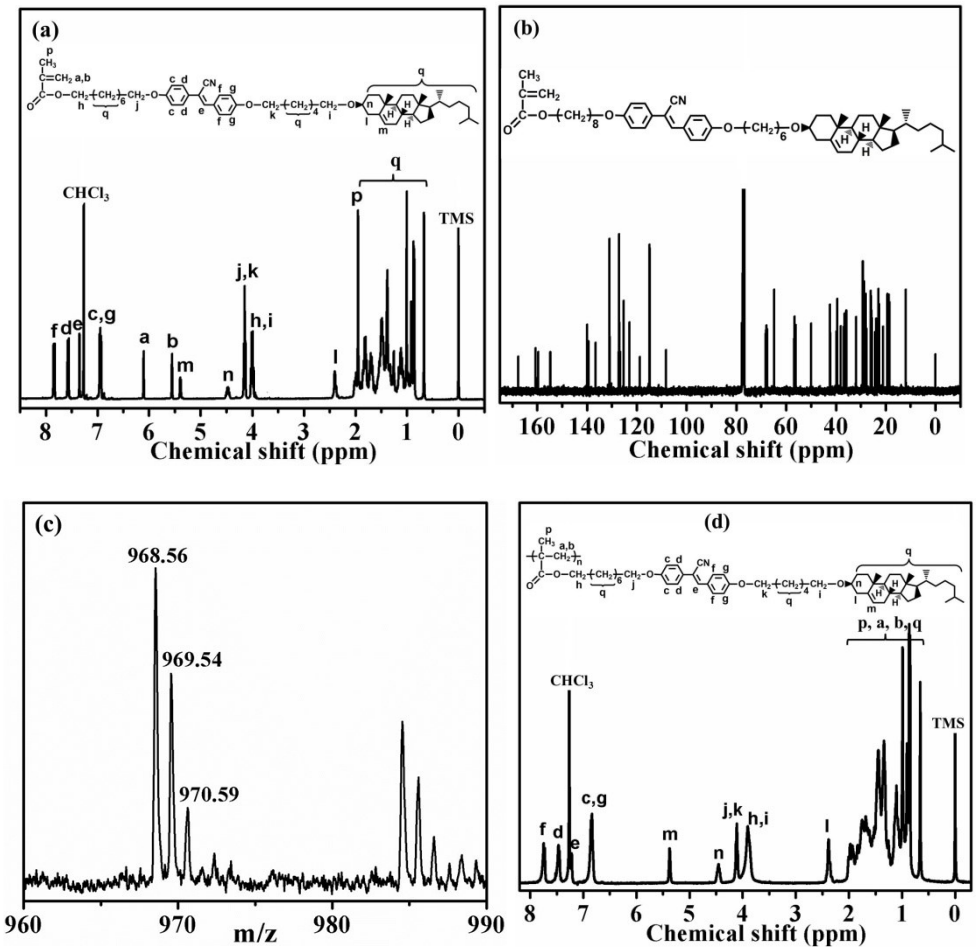

Fig. S2 The ^{1}H NMR spectrum (a), ^{13}C NMR spectrum (b), and mass spectrum (c) of MC8CSChol in $CDCl_3$; The ^{1}H NMR spectrum (d) of PMC8CSChol.

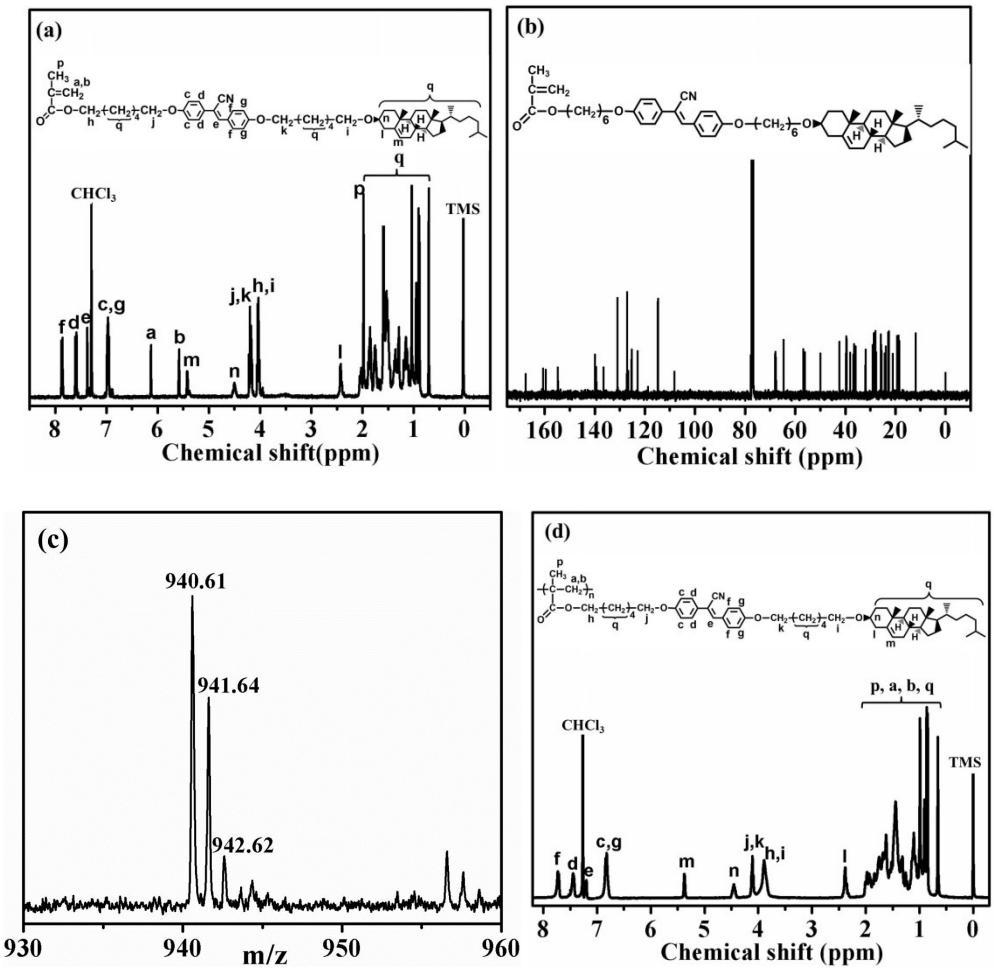

Fig. S3 The ^{1}H NMR spectrum (a), ^{13}C NMR spectrum (b), and mass spectrum (c) of MC6CSChol in $CDCl_3$; The ^{1}H NMR spectrum (d) of PMC6CSChol.

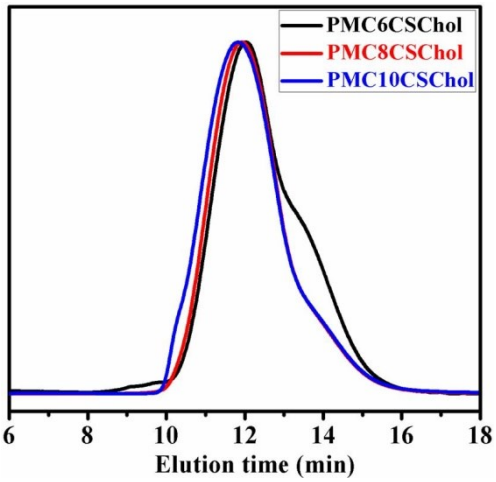

Fig. S4 GPC curves of polymers PMCmCSChol (m = 6, 8, 10).

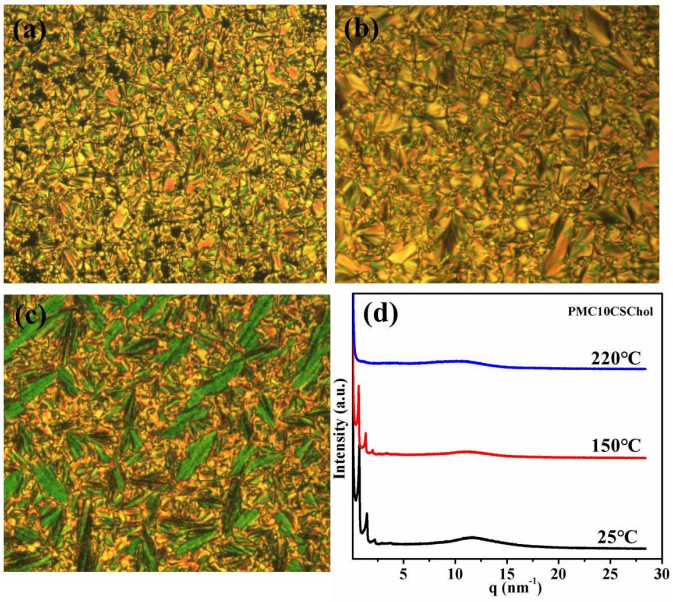

Fig. S5 The PLM textures in glassy state (captured at 25℃); (a) PMC10CSChol; (b) PMC8CSChol; (c) PMC6CSChol; (d) the representative variable-temperature SAXS patterns of PMC10CSChol during the second heating.

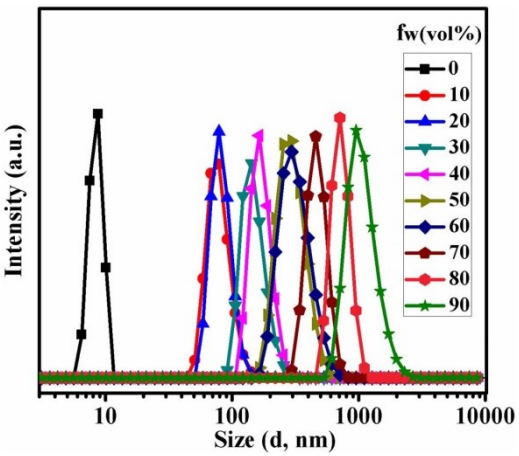

Fig. S6 The DLS of PMC10CSChol in THF/H_2O mixtures with incremental water fractions (f_w).

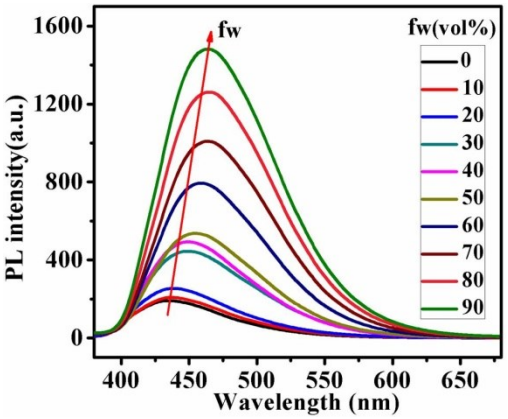

Fig. S7 Emission spectra of polymer PMC8CSChol in THF/H_2O mixtures with different volume fractions of water (f_w); Excitation wavelength = 350 nm, Concentration = 1×10^{-5} M.

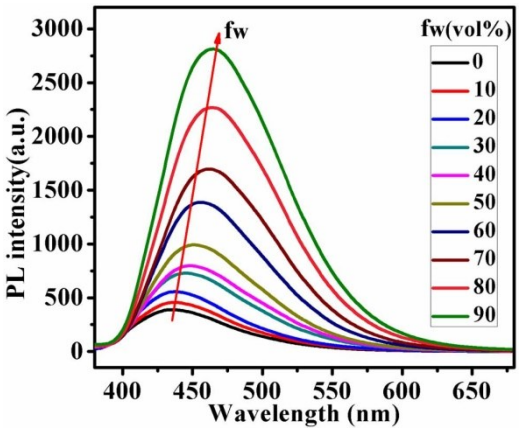

Fig. S8 Emission spectra of polymer PMC6CSChol in THF/H_2O mixtures with different volume fractions of water (f_w); Excitation wavelength = 350 nm, Concentration = 1×10^{-5} M.

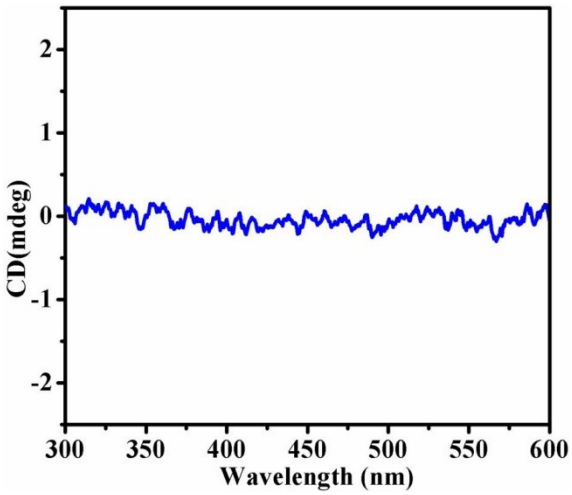

Fig. S9 CD spectrum of PMC10CSChol in THF.

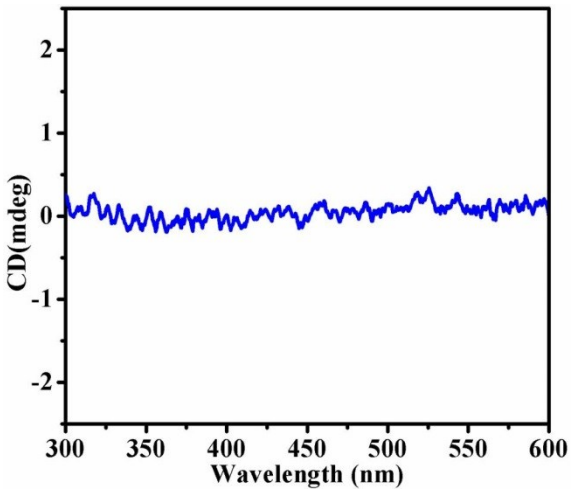

Fig. S10 CD spectrum of PMC8CSChol in THF.

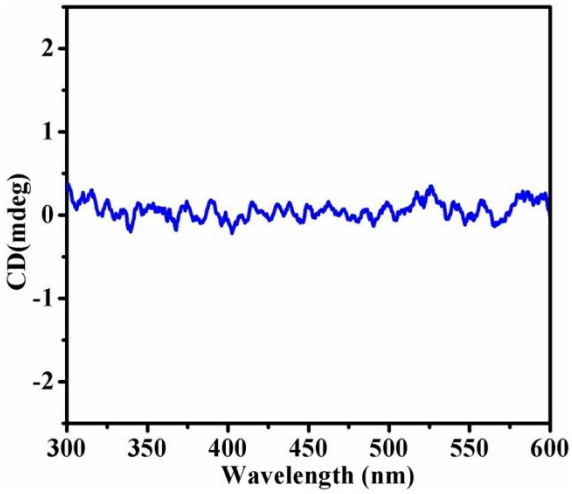

Fig. S11 CD spectrum of PMC6CSChol in THF.

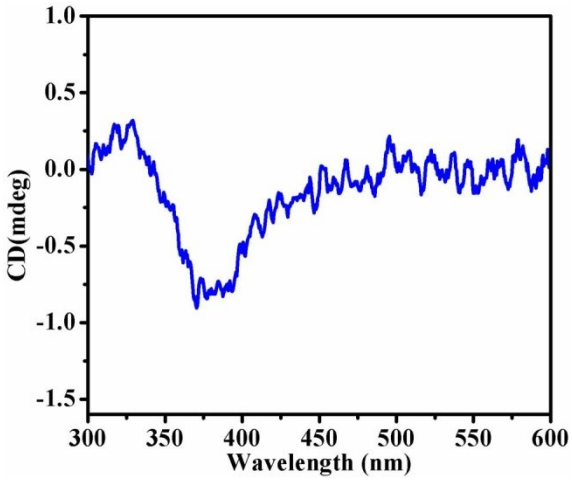

Fig. S12 CD spectrum of PMC10CSChol in the spin-coating film.

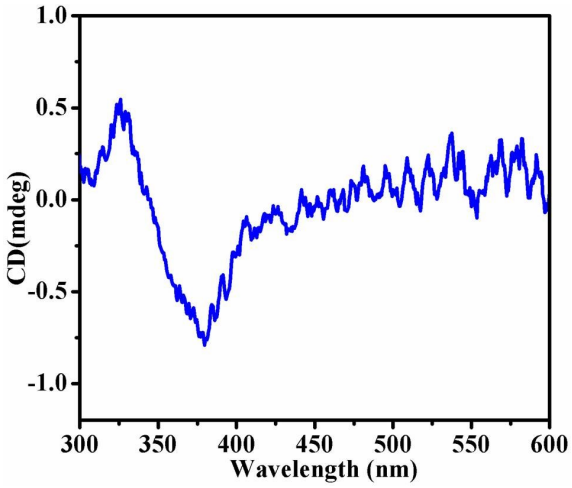

Fig. S13 CD spectrum of PMC8CSChol in the spin-coating film.

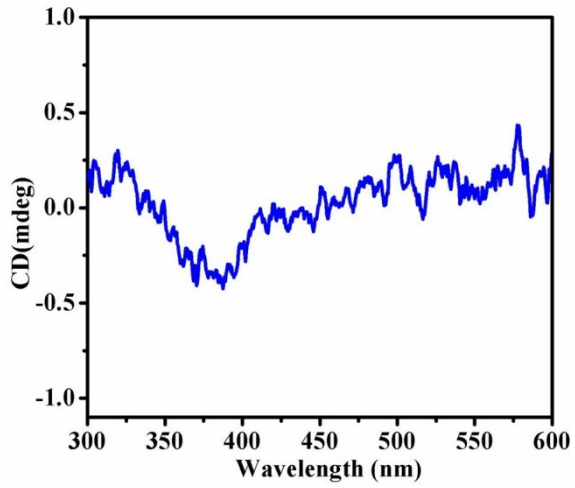

Fig. S14 CD spectrum of PMC6CSChol in the spin-coating film.