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Electronic Supplementary Information

Fluorescent nematic liquid crystalline oligomers with Reversible Texture and Photoluminescence response to Temperature

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2. Experimental

2.3 Synthesis and characterizations of pyren-2-ylmethyl undec-10-enoate (M_3)

Synthesis of pyren-2-ylmethyl undec-10-enoate (M_3): M_3 was a kind of pyrene compound, which was prepared by the following steps. Firstly, 1-pyrene methanol (2.3227 g, 0.01 mol) was dissolved in 25 mL THF at room temperature to form solution, dropping 1 mL pyridine into the solution and then 10-undecylenoyl chloride (2.0272 g, 0.01 mol) was added dropwise to the solution at room temperature. The reaction mixture was stirred at room temperature for 12 h. The mixture was poured into 200 mL cold water. The precipitated crude product was filtered, recrystallized in ethyl alcohol, isolated by filtration, and dried at 25 °C in a vacuum oven to obtain milk white pyrene compound M_3. The synthetic routes of M_3 is showed in Fig. S1. Yield: 76%. IR (KBr): 3042 cm^{-1} (=CH), 2926, 2853 cm^{-1} (–CH_3, –CH_2–), 1733 cm^{-1} (C=O), 1640 cm^{-1} (C=C), 1602, 1460 cm^{-1} (Ar–). ^{1}HNMR (500 MHz, $CDCl_3$, δ): 8.31-8.34 (d, 10H), 8.23-8.27 (t, 2H), 8.19-8.22 (d, 2H), 8.10-8.13 (d, 2H), 8.05-8.10 (m, 2H), 5.88 (s, 2H), 5.78-5.85(m, 1H), 4.98-5.04 (d, 1H), 4.94-4.98 (d, 1H), 2.40-2.44 (t, 2H), 2.00-2.05 (m, 2H), 1.65-1.69 (m, 2H), 1.21-1.34 (m, 10H). FTIR spectra and ^{1}HNMR (500 MHz) spectra of M_3 are shown in Fig. S2 and Fig. S3.

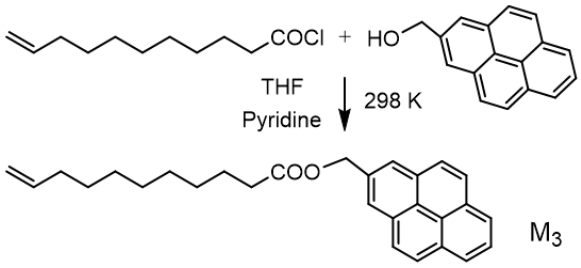

Fig S1. Synthetic route of M_3

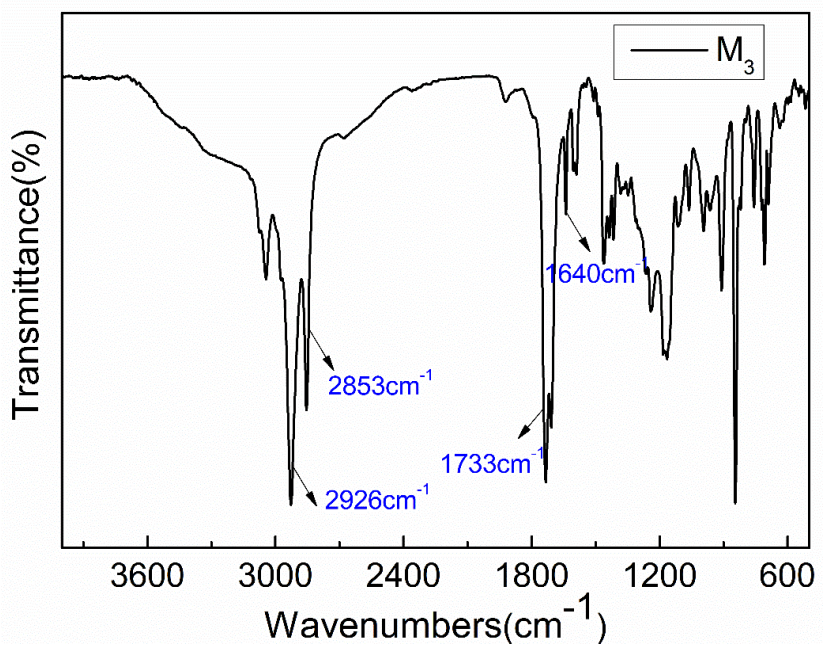

Fig. S2. FTIR spectra of M_3

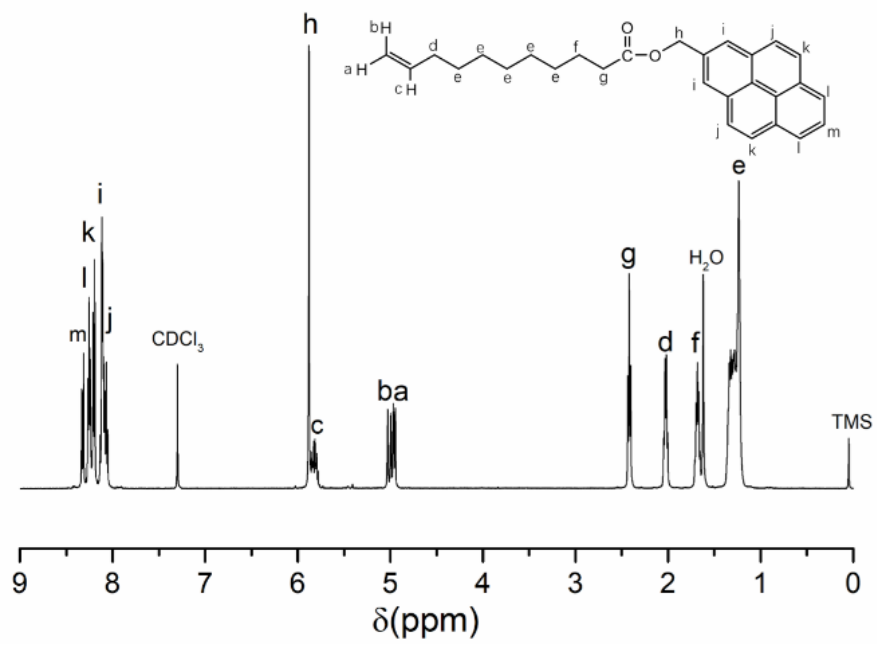

Fig. S3. ^{1}HNMR (500 MHz) spectra of M_3

2.4 The synthesis of fluorescent nematic liquid crystalline oligomers (FNLCO)

The feed ratio of FNLCO was shown in Table S1. The FNLCO was obtained according to previously reported synthesis method. liquid crystal monomer M_1 (0.2992 g, 0.90 mmol), monomer

M_2 (0.0099 g, 0.04 mmol), fluorescent pyrene compound M_3 (0.0160 g, 0.04 mmol) and PMHS (0.0920 g, 0.20 mmol) were dissolved in 15 mL of dry, freshly distilled tetrahydrofuran. 0.2 mL of Pt catalyst (0.50 g of platinum hexachloride dissolved in 100 mL of THF) was added to the stirred solution and heated under nitrogen and anhydrous conditions at 60 °C for 48 h. The reaction was monitored by detecting the Si–H band at 2166 cm^{-1} in the FT-IR spectra. The completely disappearance of the Si–H band indicated successful incorporation of M_1, M_2 and M_3 into the polysiloxane chains. After cooling to room temperature, the mixture was filtered. FNLCO was obtained after the solvent evaporated, washed with methanol and dried at 45 °C in a vacuum oven for 24 h. FT-IR spectra of FNLCO were shown in Fig. S4.

Table S1. Feed Ratio

Sample	PMHS(mmol)	M_1(mmol)	M_2(mmol)	M_3（mmol）	M_2（mol%）	M_3（mol%）
FNLCO	0.20	0.90	0.06	0.04	6	4

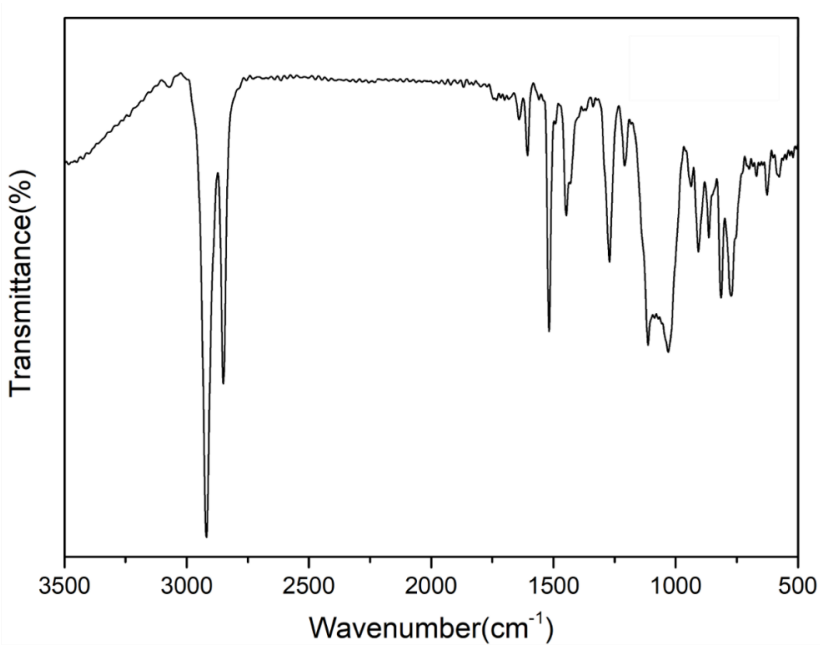

Fig. S4. FT-IR spectra of FNLCO

3. Results and discussion

3.2 Temperature-controlled fluorescence properties

The absorbance spectrum of FNLCO is shown in Fig. S5.

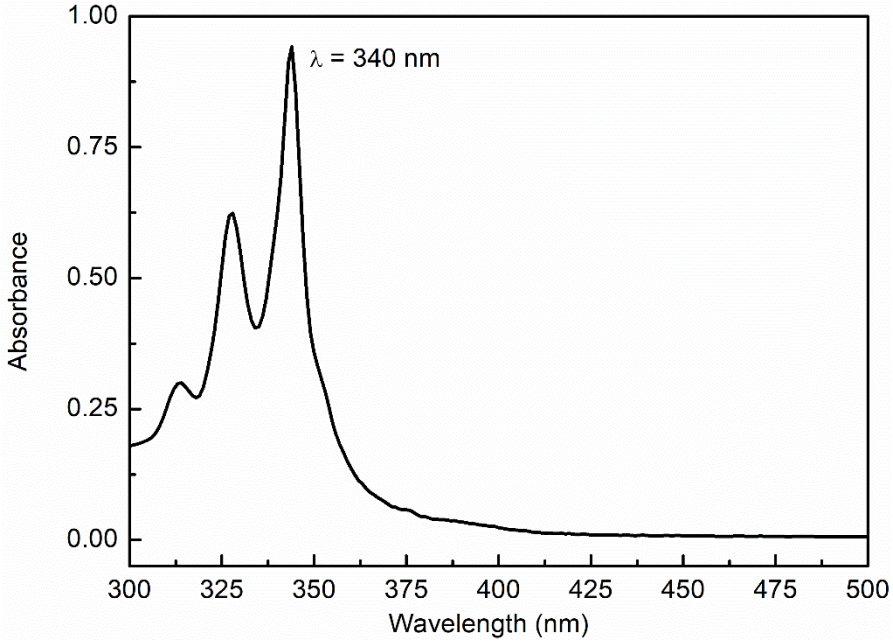

Fig. S5. The absorbance spectrum of FNLCO

Movie S1: The visualized evolution of fluorescence emission (excitation at 340 nm) of FNLCO when heating from 30 °C to 110 °C and cooling from 110 °C to 30 °C at the heating and cooling rates of 10 °C /min.