

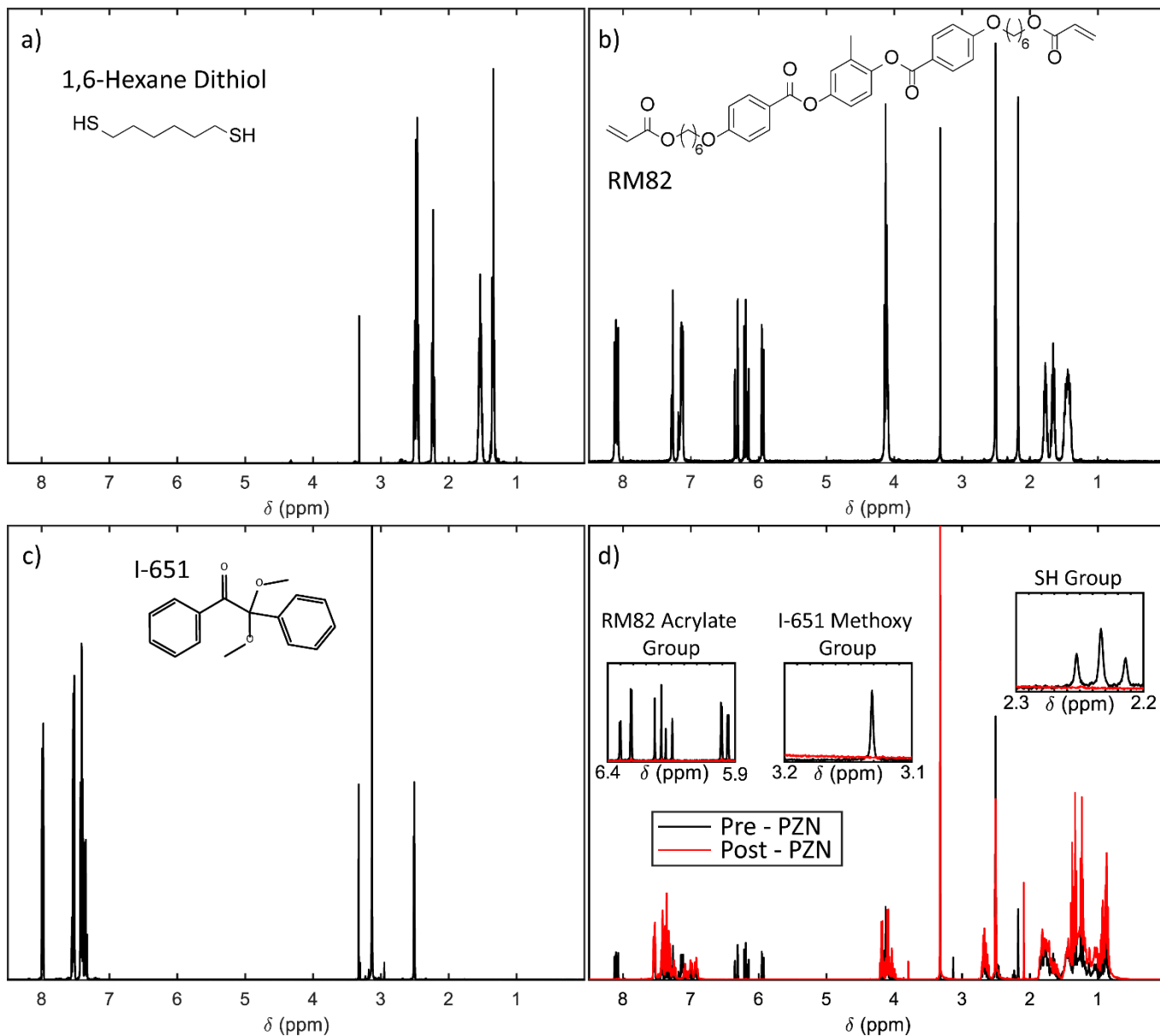
## **Electronic Supporting Information for**

# **The contribution of network elasticity to electro-optic response in polymer stabilized cholesteric liquid crystals**

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**Figure S1** NMR results in DMSO- $\text{D}_6$  for the pure components that will make up the stabilizing polymer network after UV exposure (a-c). (d) NMR taken of the liquid crystal mixture prior to polymerization (black) and the non-reacted components extracted from the cell after polymerization (red). The insets of (d) specifically call out unique and distinguishable peaks from the various polymer network components. This mixture was created in the nematic phase with 20wt% RM82, a 2.5:1 molar ratio of RM82 to HDT, and 0.5wt% I-651 in MLC-2079.

#### NMR Results:

##### 1,6 – Hexane Dithiol

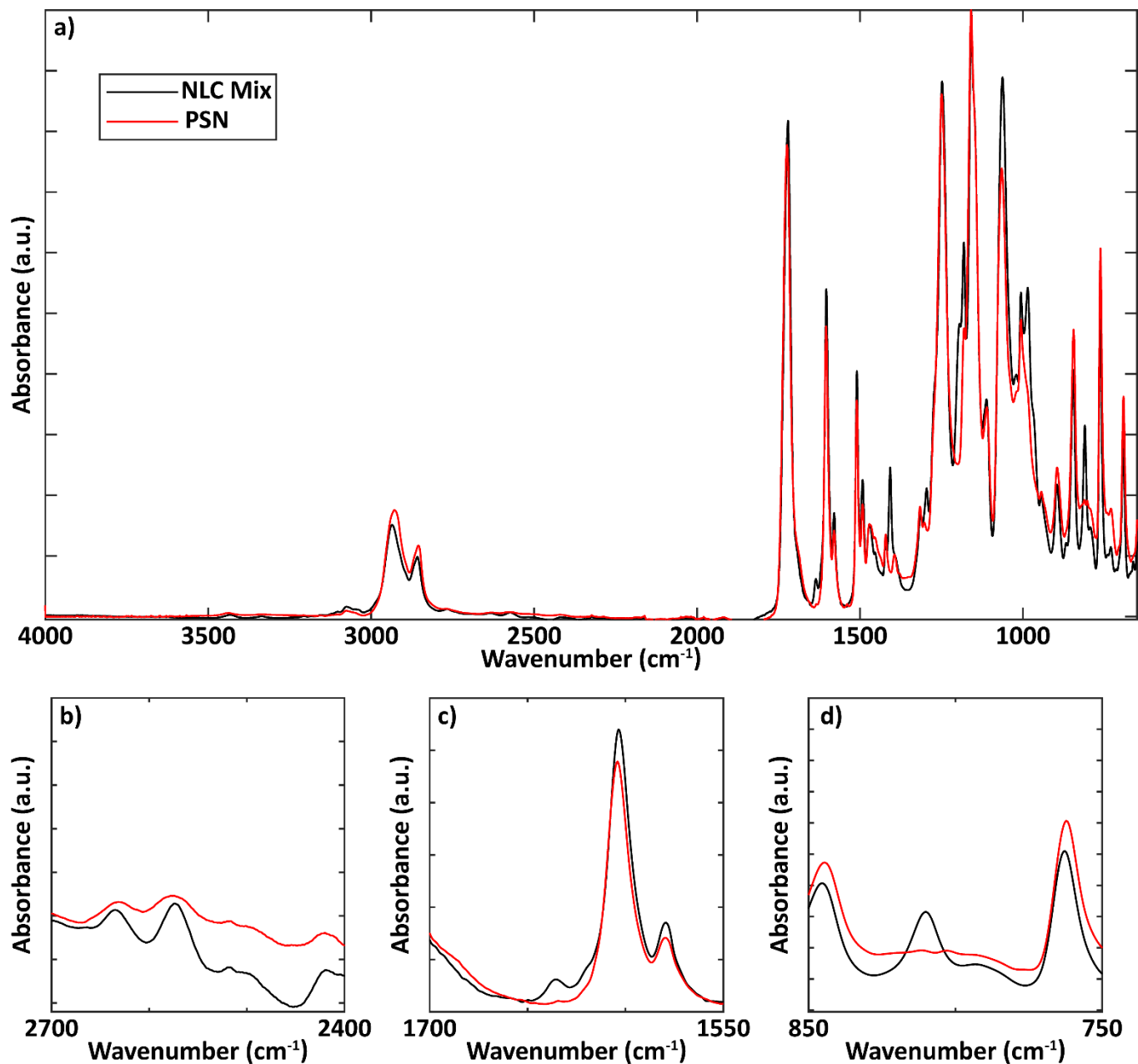
$^1\text{H-NMR}$  (DMSO- $\text{D}_6$ , 400 MHz): 2.47 (q, 4H), 2.23 (t, 3H), 1.53 (m, 4H), 1.34 (m, 4H)

##### RM82

$^1\text{H-NMR}$  (DMSO- $\text{D}_6$ , 400 MHz): 8.10 (dd, 4H), 7.28 (m, 2H), 7.15 (m, 5H), 6.33 (dd, 2H), 6.18 (dd, 2H), 5.94 (dd, 2H), 4.12 (m, 8H), 2.18 (s, 3H), 1.77 (p, 4H), 1.66 (p, 4H), 1.45 (m, 8H)

##### I-651

$^1\text{H-NMR}$  (DMSO- $\text{D}_6$ , 400 MHz): 7.98 (m, 2H), 7.53 (m, 3H), 7.40 (m, 5H), 3.13 (s, 6H)

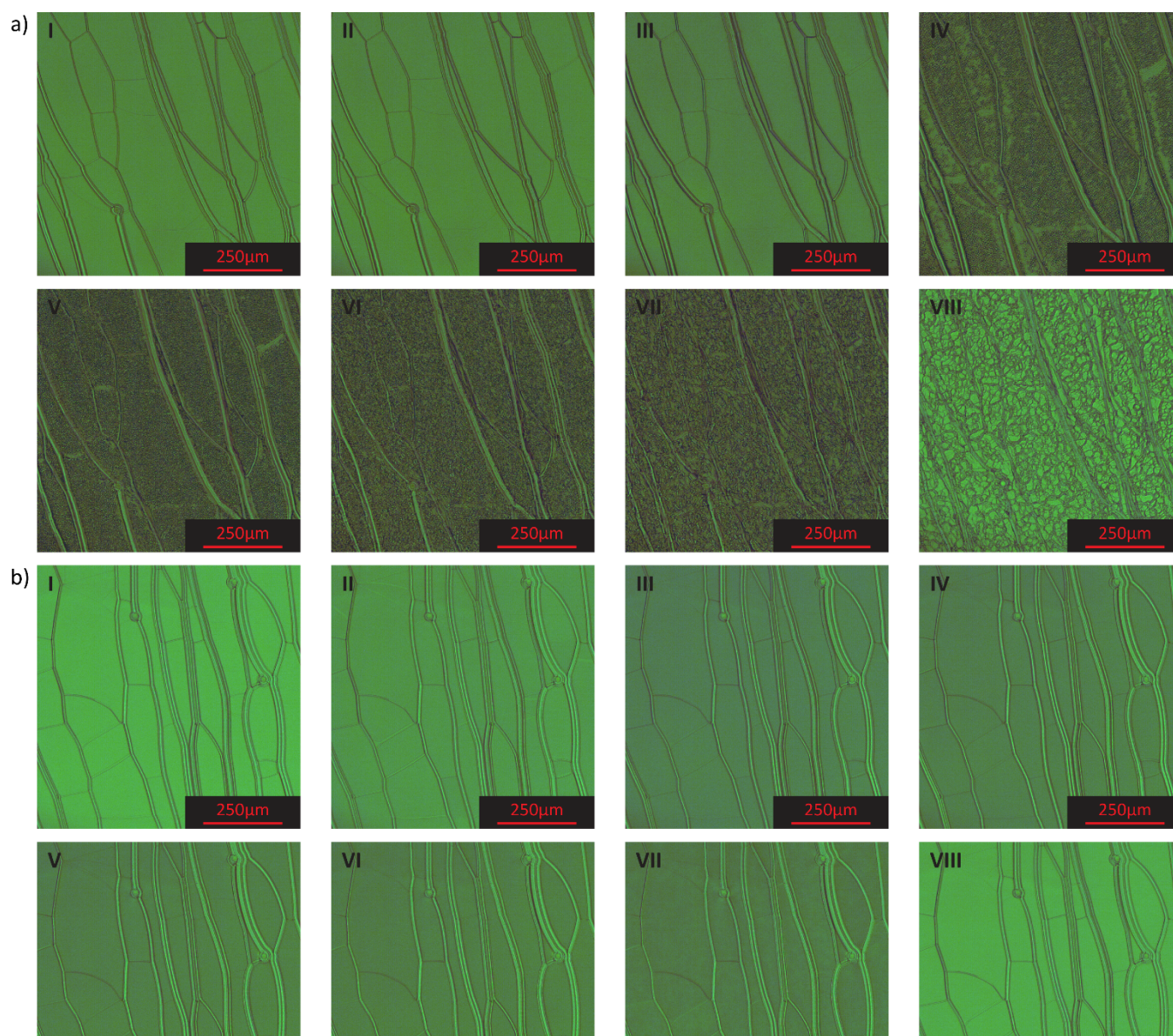


**Figure S2** (a) FTIR results for the non-reacted liquid crystal mixture (black) and the polymer network (red) after the non-reacted components had been leached out and the sample dried. (b-d) specific sections of the spectrum have been highlighted in order to show the (b) thiol peak at  $2573\text{ cm}^{-1}$ , (c) acrylate peak at  $1636\text{ cm}^{-1}$ , and (d) acrylate peak at  $810\text{ cm}^{-1}$

Weight Percent	Molar Ratio	Ion Density
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MLC-2079	S1011	S811	I-651	RM82	RM82:HDT	(ions/cm <sup>3</sup> )
100%	-	-	-	-	-	$2.4135 \times 10^{12}$
84.5%	5%	5%	0.5%	5%	1:0	$3.8122 \times 10^{13}$
69.5%	5%	5%	0.5%	20%	1:0	$6.1923 \times 10^{13}$
84.05%	5%	5%	0.5%	5%	2.5:1	$4.2687 \times 10^{13}$
68.72%	5%	5%	0.5%	20%	2.5:1	$7.1768 \times 10^{13}$

**Table S1** Ion density of selected mixtures prior to polymerization. The ion density was calculated by the steady state leakage current method.



**Figure S3** Polarized optical microscope images of PSCLC samples. (a) 5wt% RM82 with a 2.5:1 molar ratio of RM82:HDT (I) 0V, (II) 5V, (III) 10V, (IV) 15V, (V) 20V, (VI) 25V, (VII) 30V, (VIII) 0V after 10 min relaxation. (b) 15wt% RM82 with a 2.5:1 molar ratio of RM82:HDT (I) 0V, (II) 15V, (III) 30V, (IV) 45V, (V) 60V, (VI) 75V, (VII) 90V, (VIII) 0V after 10 min relaxation.