Supporting Information for:

# Electro-responsive 1-D nanomaterial driven broad-band reflection in chiral nematic liquid crystals

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## Materials used in the experiment

The chiral nematic liquid crystal (N*-LC) was obtained by doping a chiral dopant into a nematic liquid crystal (N-LC). The N-LC used was SLC10V513-200 (Yongsheng Huatsing Liquid Crystal Co., Ltd) with negative dielectric anisotropy. A left-handed chiral dopant (D1), 1,1-binaphthyl-2,2-diyl bis(4-(4-pentylcyclohexyl)benzoate), was synthesized according to the methods suggested by Zihui Cheng.[S1] The parameters of the N-LC and the chemical structures of the chiral dopant are showed in Figure S1. In our experiment, $Bi_2S_3$ nanoparticles (NP) were prefabricated by mechanical alloying method[S2] and $Bi_2S_3$ nanotubes (NT-1, NT-2) and nanowires (NW) were parepared by hydrothermal synthesis method.[S3, S4]

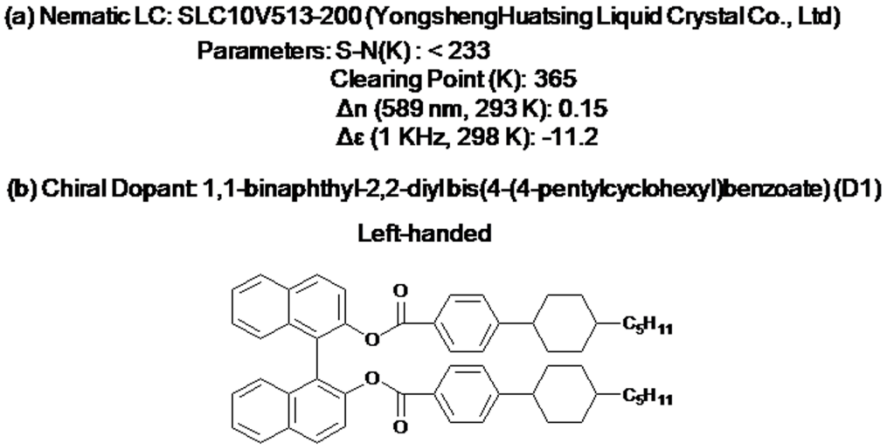


**Fig. S1** The parameters of the N-LC (a) and the chemical structures of the chiral dopant (b).

## Preparation of the samples

In order to achieve good dispersion, the mixtures with the N*-LC and $Bi_2S_3$ nanomaterials were dissolved in acetone and ultrasonicated for about 1.0 h. Then, the acetone was evaporated off completely for about 24.0 h above 318.0 K before the samples were placed in a vacuum system at 1023 Torr for 24.0 h at 323.0 K. To obtain homogeneous alignment, a 2.0 wt% polyvinyl alcohol (PVA) aqueous solution was coated onto the inner surfaces with indium/tin oxide of the cells. The deposited film was dried at 353.0 K for about 30.0 min, and subsequently rubbed with a textile cloth under a pressure of 2.0 g $cm^{-2}$ along one direction. The thickness of the cells was controlled as 20.0±1.0 μm. Subsequently, the empty cells were filled with the mixtures by capillary action at room temperature. An alternating current (AC) field with the strength ranging from 0.0 V/μm to 9.5 V/μm at 1.0 KHz was applied on the samples and the transmission spectra of the samples were collected by a UV/visible spectrophotometer (JASCO V-570).

**The time effect on the sample**

The effect of time on the bandwidth of the composites was examined by applying the electric field on the samples at 9.5 V $\mu m^{-1}$ for 60 min. The result of the NT-1/N*-LC composite is depicted in Figure S2. It shows that the $\Delta\lambda$ keeps invariant during 60 min.

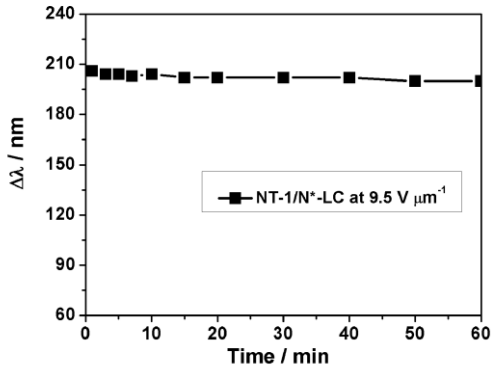


**Fig. S2** The effect of time on bandwidth of the NT-1/N*-LC composite at 9.5V $\mu m^{-1}$.

**References for supporting information**

[S1] Z. H. Cheng, K. X. Li, R. W. Guo, F. F. Wang, X. J. Wu, L. P. Zhang, J. M. Xiao, H. Cao, Z. Yang and H. Yang, *Liq. Cryst.*, 2011, **38**, 233.

[S2] Z. H. Ge, B. P. Zhang and Z. X. Yu, *J. Mater. Res.*, 2011, **26**, 2711.

[S3] Z. H. Ge, B. P. Zhang, Z. X. Yu and B. B. Jiang, *Cryst. Eng. Comm.*, 2012, **14**, 2283.

[S4] Z. H. Ge, B. P. Zhang, P. P. Shang and J. F. Li, *J. Mater. Chem.*, 2011, **21**, 9194.