Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.


# SUPPORTING INFORMATION

## Photo- and electro-controllable 2D diffraction gratings prepared using electrohydrodynamic instability in nematic polymerizable mixture

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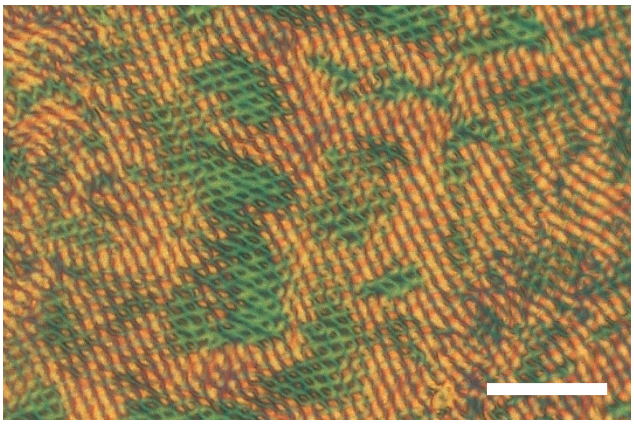

**Figure S1.** POM image of the mixture after photopolymerization under field 16 V. Scale is 50 µm

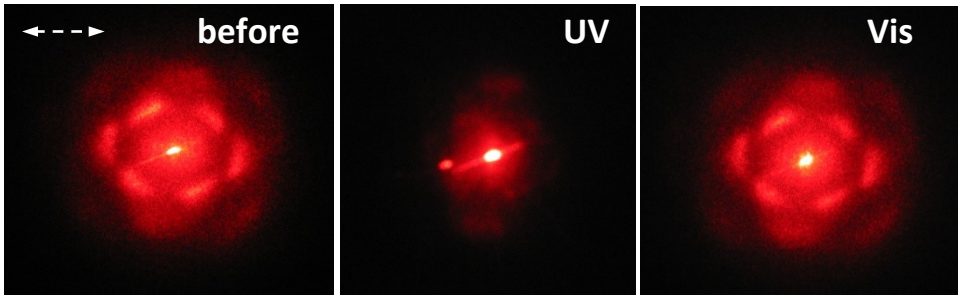


**Figure S2.** Diffraction patterns of HeNe laser for composite photochromic grating before, after UV irradiation (10 min, 382 nm, ~1 mW/cm$^2$) and after subsequent visible light action (1 min, 428 nm, ~10 mW/cm$^2$). Mixture was polymerized at 18 V.

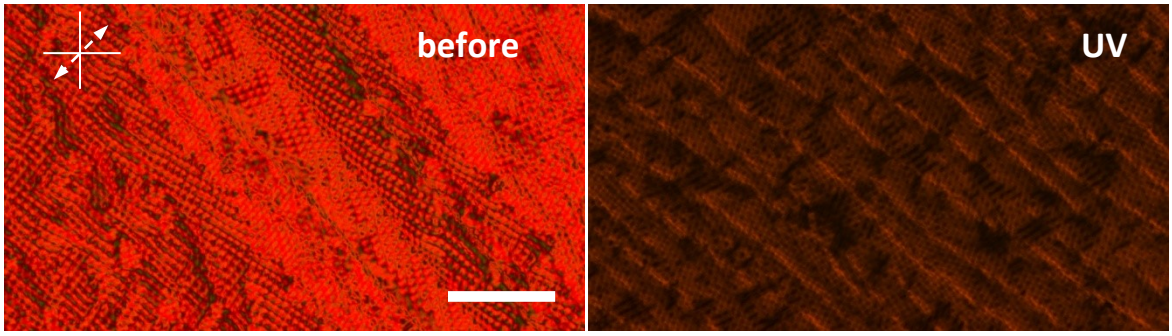


**Figure S3.** POM images of the photochromic grating before and after UV irradiation (4 min, 382 nm, ~1 mW/cm$^2$). Polymerization was performed under application 17 V field. Scale is 50 µm.

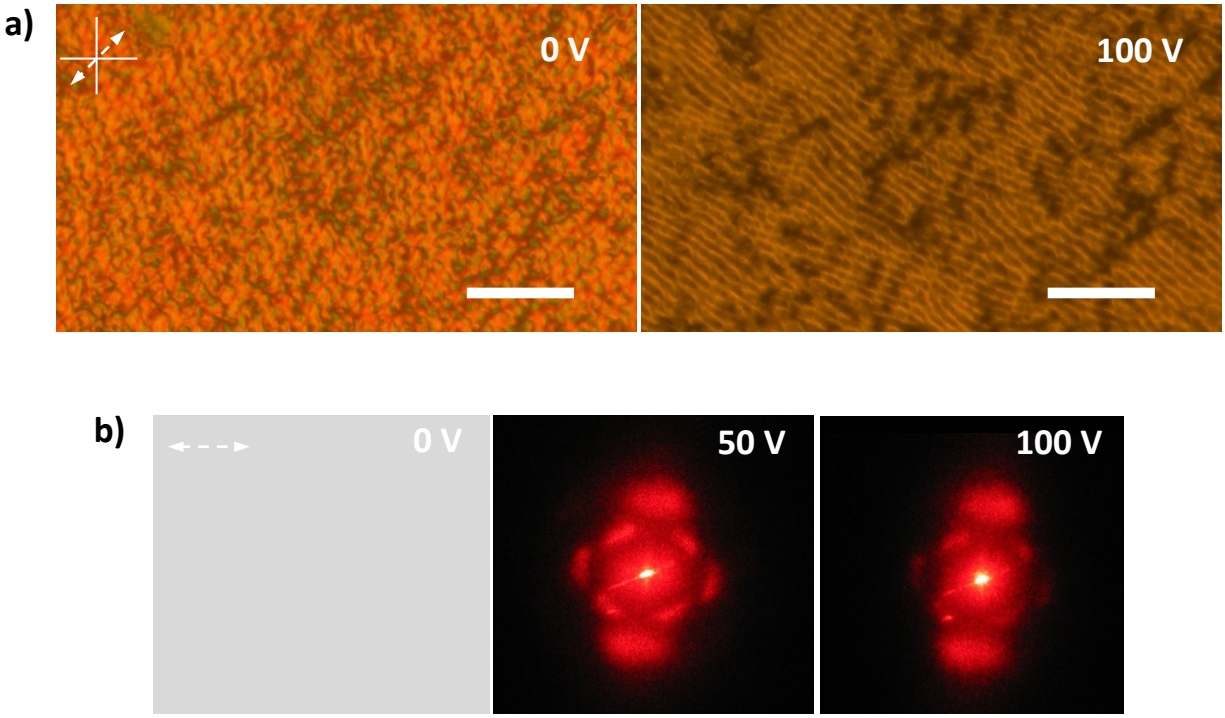


**Figure S4.** (a) POM images of the grating at different applied electric field (shown in figure). Mixture was polymerized at 18 V. (b) Diffraction patterns of HeNe laser for composite refilled with 5CB+6DABU at different electric field (1 kHz). Mixture was polymerized at 18 V. Scale is 50 µm.

## Calculation of the interlayer distances

Interlayer distances *d* were calculated by determination of scattering angle Θ by the following equation (1):

$$\tan 2\theta = \frac{D}{2A}, \quad (1)$$

were D is the diameter of reflex on the flat screen, A is the distance between screen and sample.

Values of *d* were calculated as follows (2):

$$d = \frac{\lambda}{2\sin\theta}, \quad (2)$$

were λ is the light wavelength (0.633 μm in our case).

## List of videos

**Video S1.** POM image of the nonpolymerized mixture under the gradual increase of the applied voltage from 0 V to 20 V.

**Video S2.** Switching of the diffraction pattern of photochromic composite DG under application of 100 V (1 kHz). (DG was prepared by polymerizing LC mixture at 18 V (50 Hz).

**Video S3.** Switching of the diffraction pattern of photochromic composite DG under application of 100 V (1 kHz). (DG was prepared by polymerizing LC mixture at 17 V (50 Hz).