

## Electronic Supplementary Information

### Controllable liquid crystal defect arrays induced by an in-plane electric field and their lithographic applications

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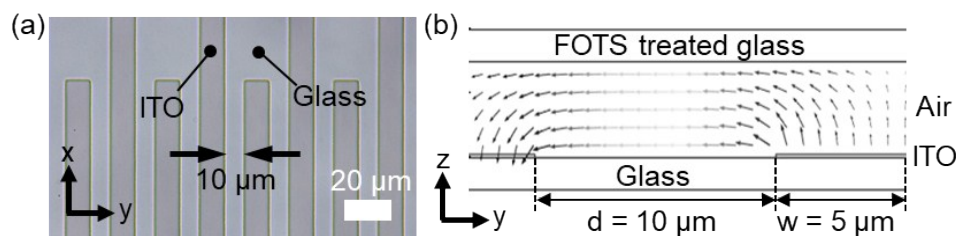
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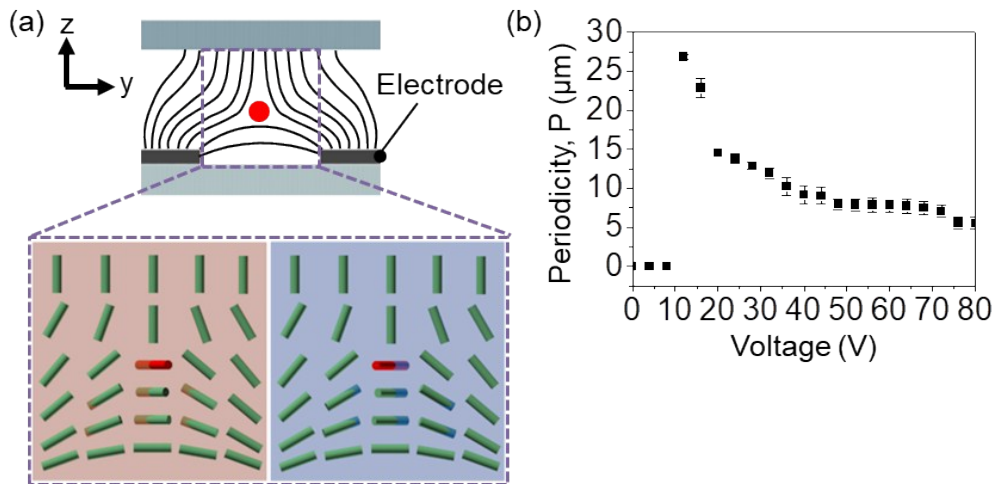
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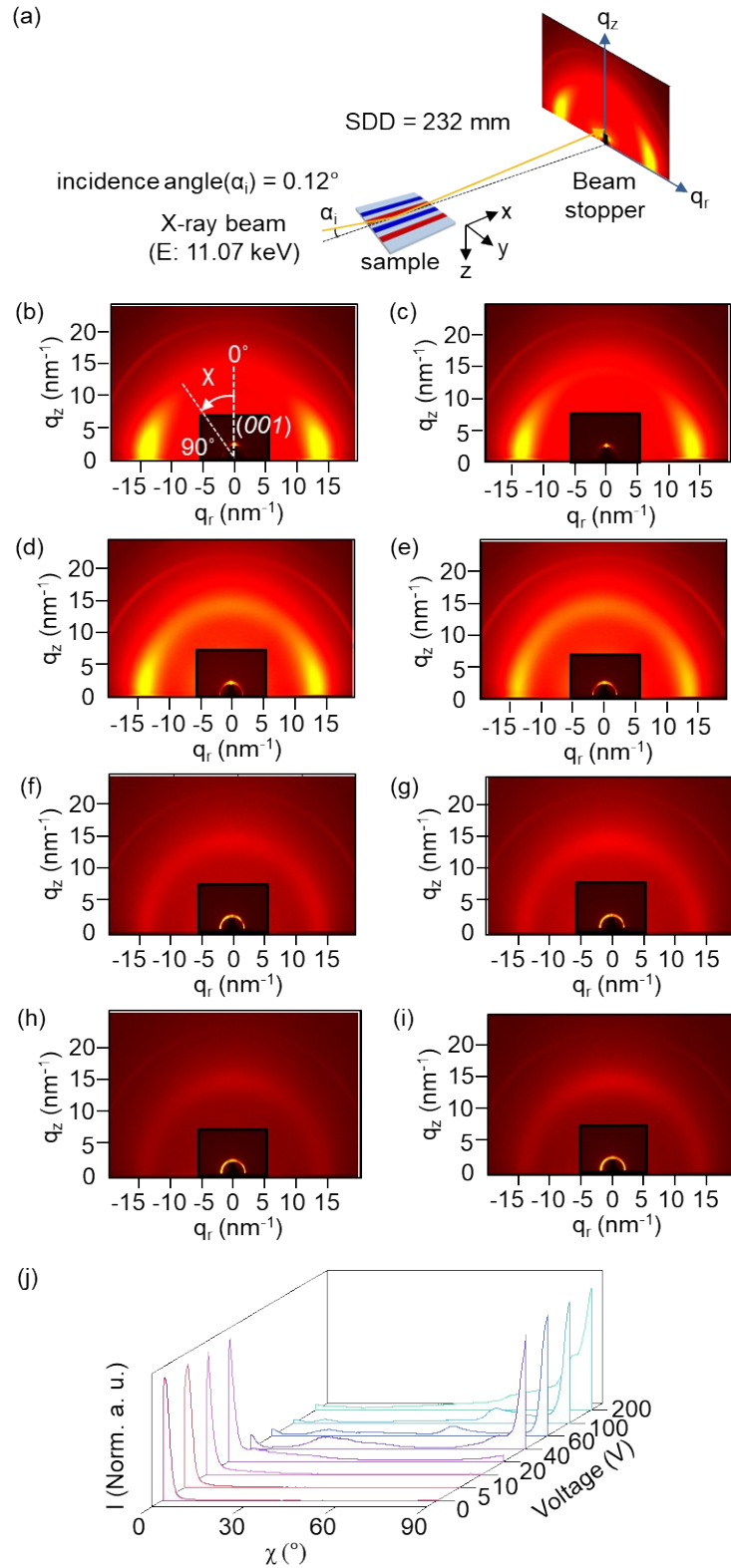
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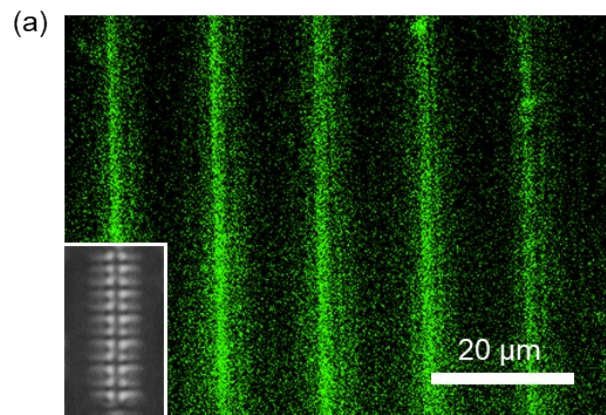
**Fig. S1** (a) Optical microscopic image of the patterned ITO electrodes on the glass substrate having 10 μm width and distance. (b) Electric field representation inside the IPS cell (side view). Due to symmetrical structure, only half electrode is represented. Arrow surface indicates the electric field.



**Fig. S2** Periodic zigzag disclination line defects with a winding number of  $-1/2$  in the N phase formed between electrodes. (a) Schematic diagram of the N director (black lines) between electrodes (dark gray regions). Red dot and cylinders indicate disclination kink and line defects, respectively. Green cylinders represent LC molecules and orange (left) and blue (right) boxes indicate each domain of orange and blue dashed lines in Fig. 2c. (b) The plot of P of the zigzag disclination lines depending on the applied electric field.



**Fig. S3** Schematic diagram of the GIXD set-up and 2D diffraction patterns of the SmA phase acquired in the small and wide angle regions. (a) Schematic of the GIXD measurements. X-ray beam is parallel to the electrode direction (x-axis). (b-i) 2D diffraction patterns depending on the applied electric field (0, 5, 10, 20, 40, 60, 100, and 200 V, respectively).  $\chi$  is defined as the azimuthal angle from  $q_z$ . Insets are 2D diffraction patterns acquired in the small angle regions. (j) Azimuthal 1D plots at each voltage in the small angle region ( $q \sim 2.0 \text{ nm}^{-1}$ ).



**Fig. S4** Fluorescent microscopy image of QD particles trapped in (a) face-to-face arrayed FCDs (at 30 V). The inset is the POM image of face-to-face arrayed FCDs. All scale bars are 20 μm.