

Supplementary Information

Field-Induced Phase Transition Behaviour of Ferroelectric Nematic Liquid Crystal under DC Electric Fields

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This document provides supplementary information to “Intrinsic Dielectric Response and Field-Induced Phase Transition Behaviour of Ferroelectric Nematic Liquid Crystal under DC Electric Fields.” Figure S1 shows the polarization reversal current measured in each phase of the DIO mixture. Figure S2 shows the POM images in the N_F phase of DIO mixture under DC electric fields. Figure S3 shows DC electric field hysteresis in the N_F phase. Table S1 shows the cell thicknesses used for the measurements and the corresponding transition temperatures (T_0) to the N_F phase.

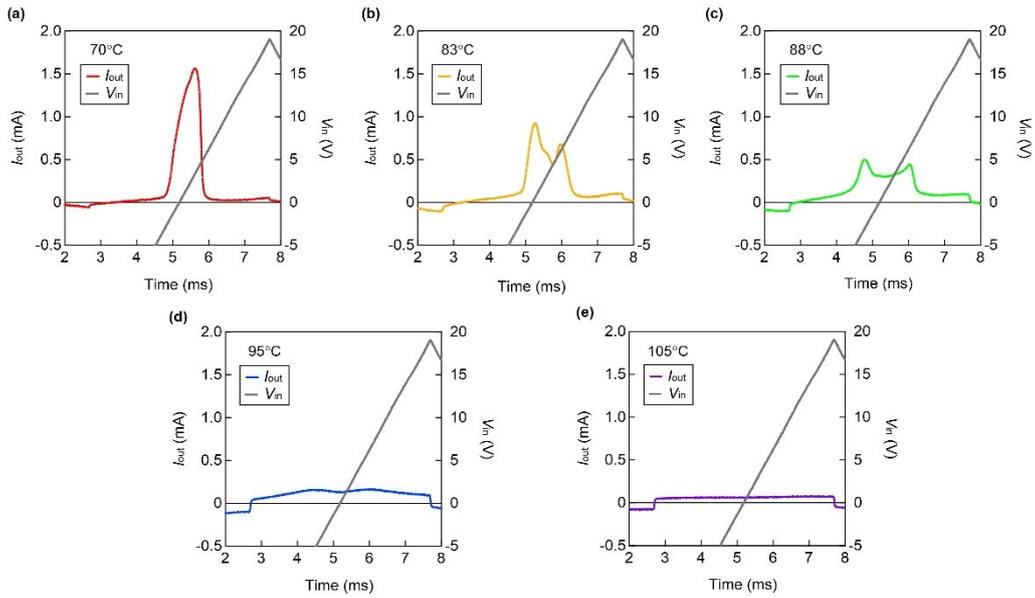


Figure S1. Polarization reversal current measured in each phase of the DIO mixture. The measurement was performed using a non-aligned cell with a thickness of $9\ \mu\text{m}$ and an electrode area of $16\ \text{mm}^2$. A triangular AC voltage with an amplitude of $20\ \text{V}$ and a frequency of $100\ \text{Hz}$ was applied, and the current was calculated from the voltage drop across a $1\ \text{k}\Omega$ resistor connected in series with the cell. (a) N_F phase ($70\ ^\circ\text{C}$), (b) near the transition to the N_F phase ($83\ ^\circ\text{C}$), (c) SmZ_A phase ($88\ ^\circ\text{C}$), (d) N_x phase ($95\ ^\circ\text{C}$), and (e) N phase ($105\ ^\circ\text{C}$)

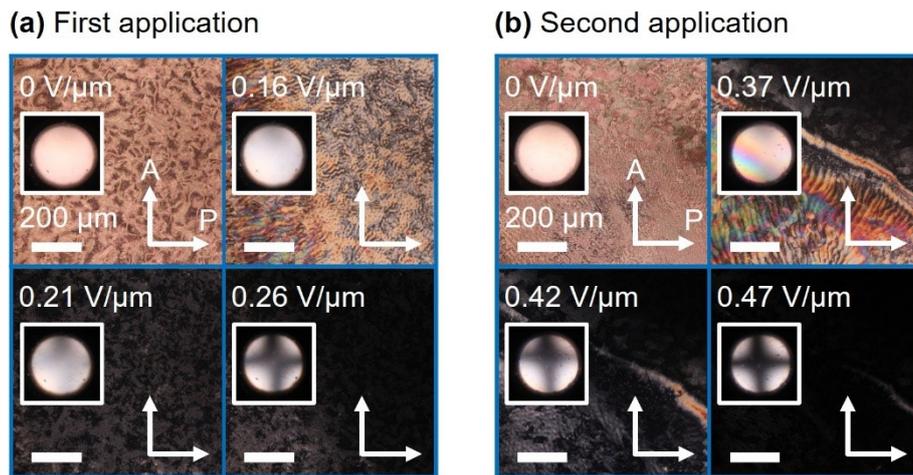


Figure S2. POM images in the N_F phase (80°C) of DIO mixture under DC electric fields in a non-aligned cell with a thickness of $19\ \mu\text{m}$: (a) First voltage application, (b) Second voltage application.

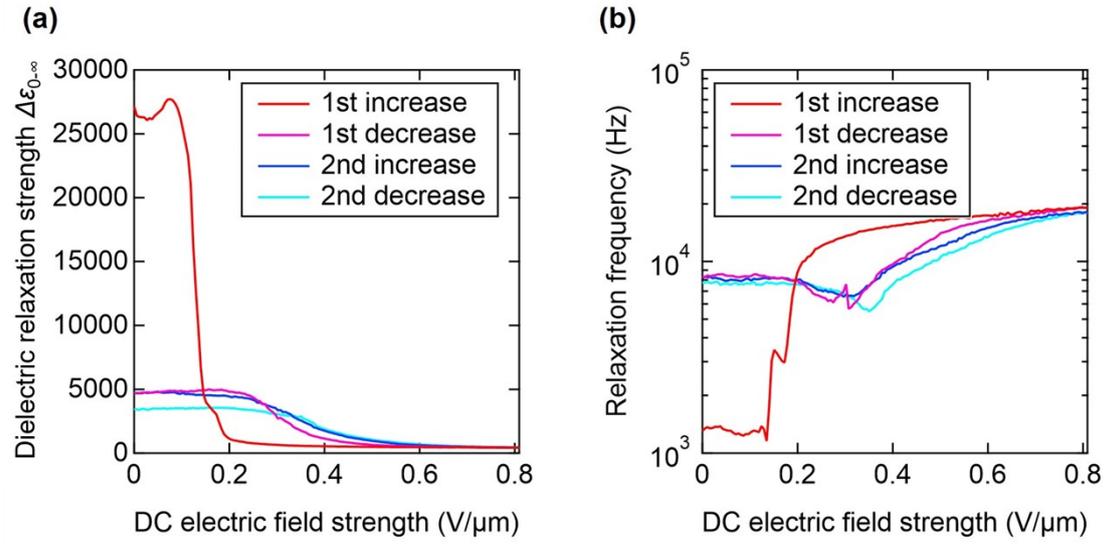


Figure S3. DC electric field hysteresis in the N_F phase (80°C) for a 19 μm thick cell: (a) dielectric relaxation strength ($\Delta\epsilon_{0-\infty}$) and (b) relaxation frequency.

Table S1

Cell thicknesses used for the measurements and the corresponding transition temperatures (T_0) to the N_F phase. T_0 is defined as the temperature at which the two types of dielectric relaxation change into a single dielectric relaxation.

Cell thickness (μm)	T_0 (°C)
8	82.4
14	82.2
19	81.8
27	81.9

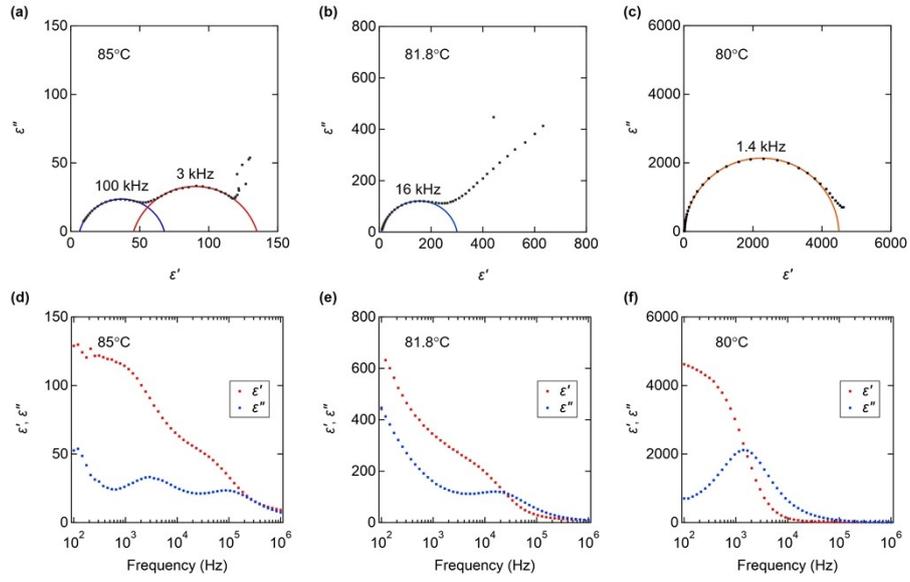


Figure S4. Dielectric measurements of the DIO mixture without applied DC electric fields in a non-aligned cell with a thickness of 19 μm . Cole-Cole plots in (a) SmZ_A phase (85 $^\circ\text{C}$), (b) near the transition to the N_F phase (81.8 $^\circ\text{C}$), and (c) N_F phase (80 $^\circ\text{C}$) and dielectric spectra in (d) SmZ_A phase (85 $^\circ\text{C}$), (e) near the transition to the N_F phase (81.8 $^\circ\text{C}$), and (f) N_F phase (80 $^\circ\text{C}$)

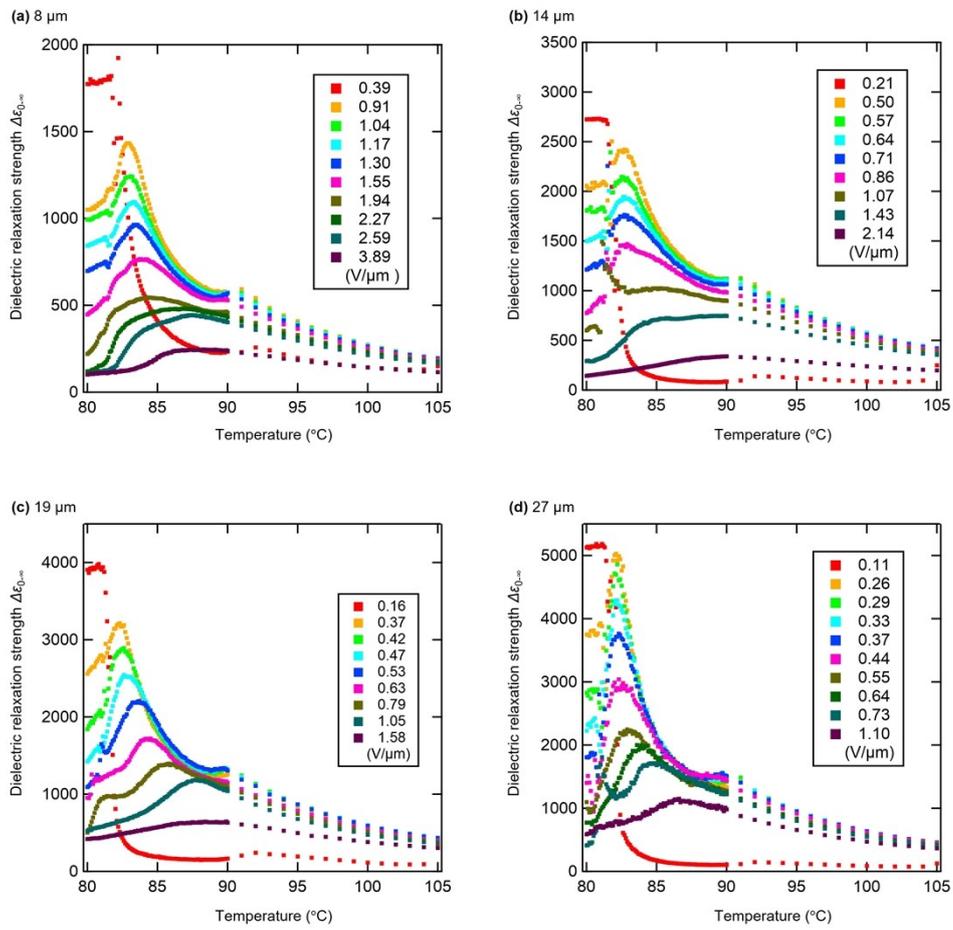


Figure S5. Temperature dependence of the dielectric relaxation strength ($\Delta\epsilon_{0-\infty}$) under DC electric fields in non-aligned cells with different thicknesses: (a) 8 μm , (b) 14 μm , (c) 19 μm , (d) 27 μm .