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Supplementary Materials for

Field-controlled structures in ferromagnetic cholesteric liquid crystals

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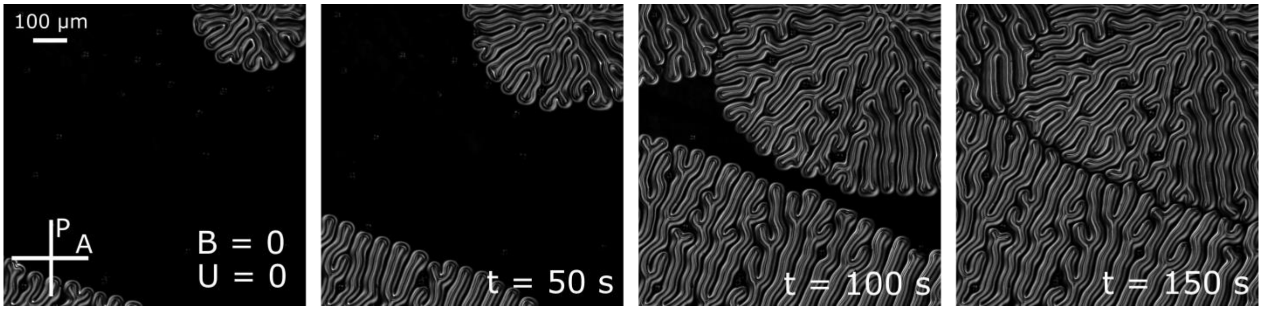

fig. S1. Inhomogeneous nucleation of cholesteric fingers in the case of *d/P* = 0.94 in the absence of external fields.

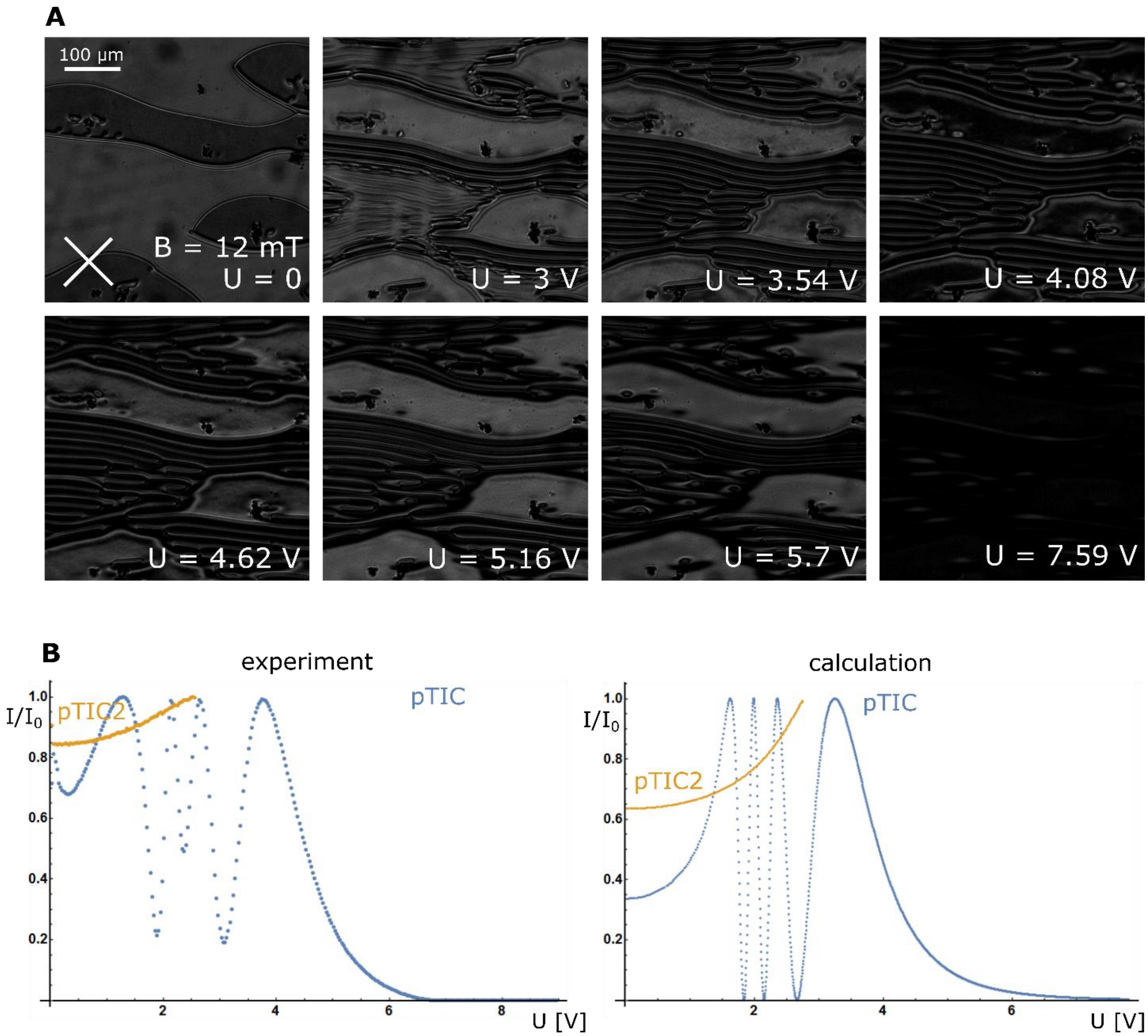

fig. S2. Comparison of the response of pTIC and pTIC2 to the electric field. (**A**) POM images as seen with monochromatic light (wavelength 632 nm) showing unwinding of the reversed pTIC (the darker regions in the 1st image) and PTIC2 (the brighter regions in the 1st image) by applying voltage. pTIC evolves continuously to the homeotropic state, pTIC2 destabilizes at $U = 3$ V. (**B**) Comparison of measured (left) and calculated (right) transmitted intensity of monochromatic light as a function of voltage for pTIC and pTIC2. The calculation of transmitted intensity was performed using Jones matrix formalism. In the calculations the anisotropy of index of refraction was 0.22 as obtained from measurements of optical Frederiks transition in nonchiral nematic suspension.

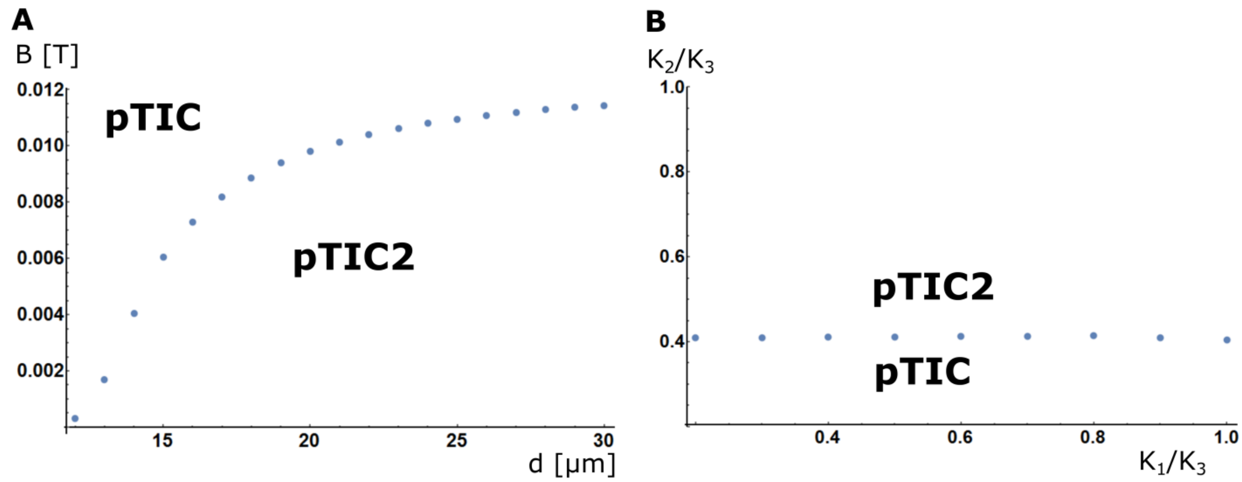

fig. S3. Phase diagrams showing stability of pTIC versus pTIC2 as obtained from 1D model. (**A**) As a function of **B** and thickness of the LC cell *d*, $U = 0$; (**B**) as a function of elastic constant ratios K_2/K_3 and K_1/K_3 at **B** = 10 mT and $U = 0$. Pitch is in both cases p =10.5 μm.

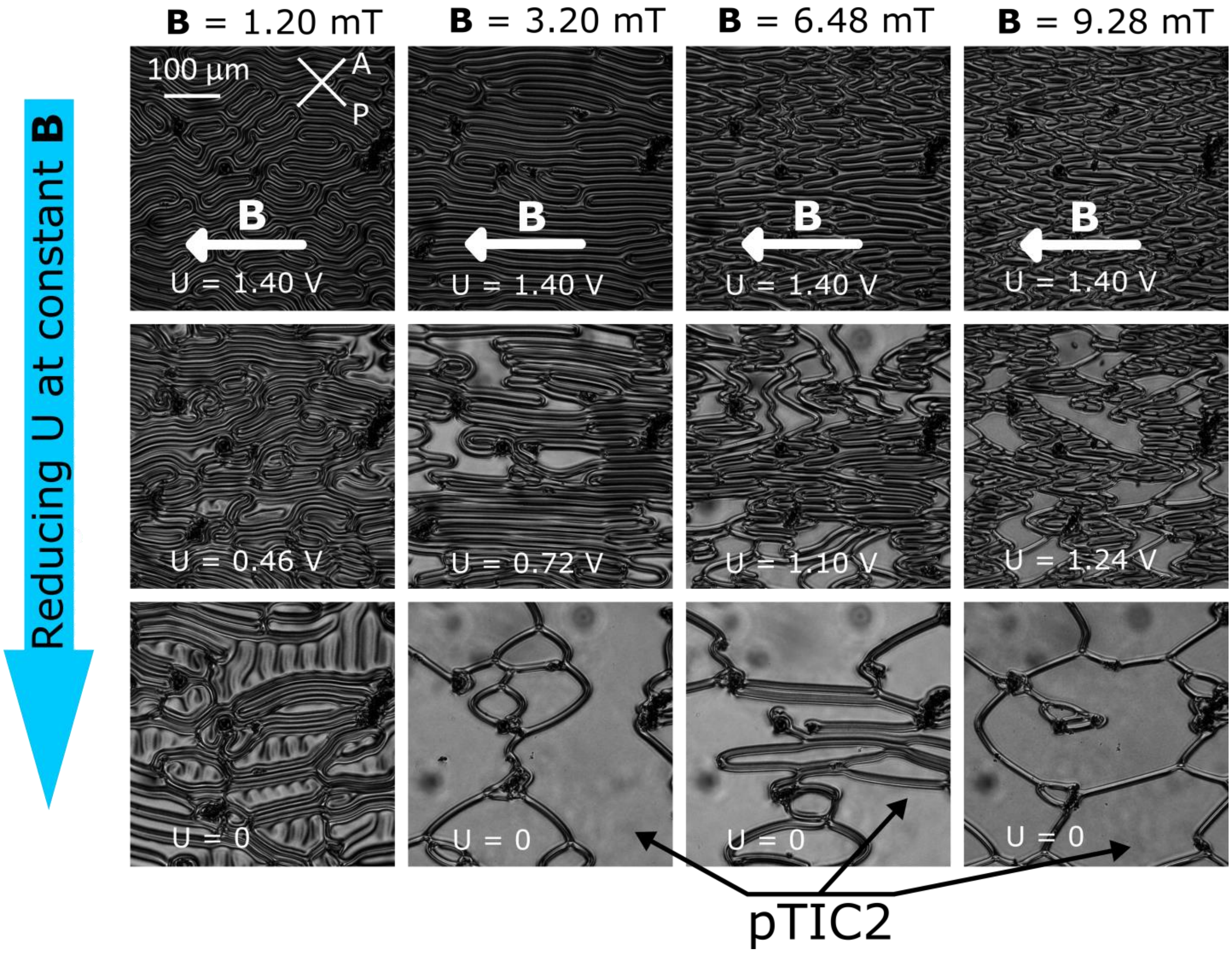

fig. S4. POM images of structures that evolve from pTIC in the case of constant B and *d/P* = 1.74. The evolution of structures below the threshold voltage U_t from Figure 2B are shown. Experiment was performed by reducing *U* in discreet steps very slowly (30 mV/2.5 min). Note that the voltage in this case was reduced more slowly than in the case shown in Fig 2B, which resulted in different structures, in particular at small **B.** It is important to note that the fingers in thick cells are not the final structure, but at small voltages another slower relaxation process follows, which results in disordered wound structure in case of **B** = 0; regions of undulating structure from Fig. 4C separated by lines (similar to oily streaks observed in ordinary CLC in planar cells*(45)*) for small **B**, and regions of pTIC2 for **B** > 1.2 mT again separated by lines.

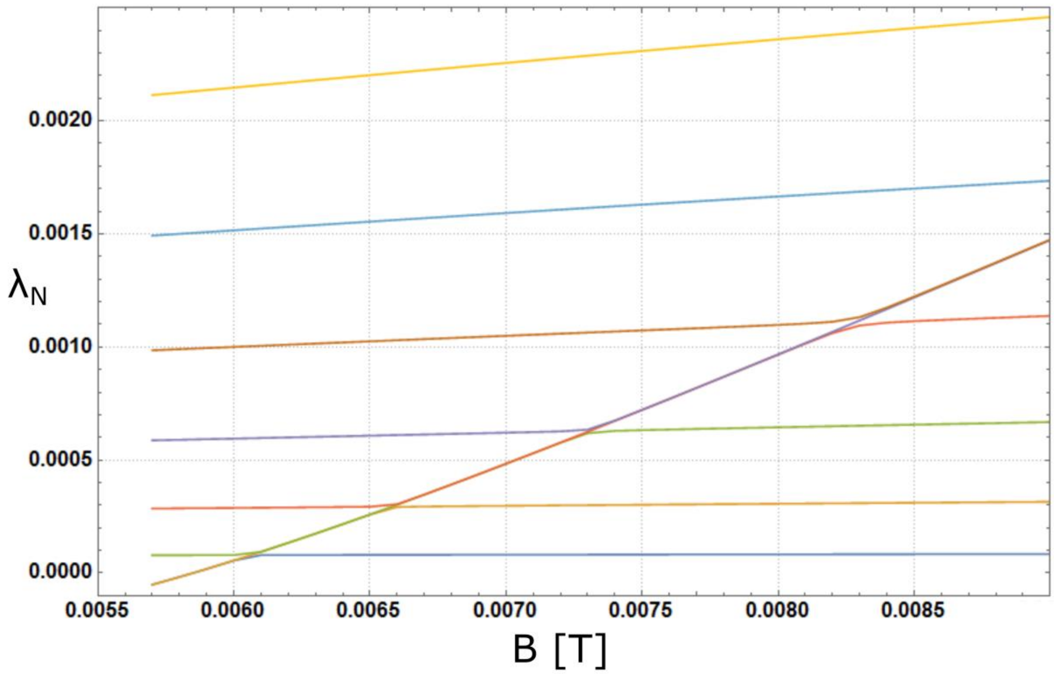

fig. S5. The eight smallest nontrivial eigenvalues of fluctuations as a function of external magnetic field showing the destabilization of the pTIC structure. *U* = 0. d/P =1.74. The $\mathbf{q}_{xy}$ at which the smallest eigenvalue appears depends weakly on the external field. In this graph the eigenvalues of the modes are calculated for the $\mathbf{q}_{xy}$, determined at threshold field.