

Instructional Review: An Introduction to Optical Methods for Characterizing Liquid Crystals at Interfaces

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Supporting information (SI)

Physical properties of liquid crystals

Table S1 shows physical properties of the liquid crystals (LCs) presented in Figure 1A of the main text (4-cyano-4'-pentylbiphenyl (5CB), E7 and TL205).

Table S1. Physical properties of the LCs displayed in Figure 1A of the main text^a

Property	5CB ^b	E7 ^c	TL205 ^d
K ₁₁ (pN)	6.3	11.7	17.3
K ₂₂ (pN)	3.9	8.8	-
K ₃₃ (pN)	8.3	19.5	20.4
T _{NI} (°C)	35	58	87.4
Δn	0.212	0.2255	0.2175
n _e	1.742	1.7472	1.7445
n _o	1.53	1.5217	1.527
$\Delta\epsilon$	20.1	14.1	5

^aNotation: K₁₁, splay elastic constant; K₂₂, twist elastic constant; K₃₃, bend elastic constant; T_{NI}, nematic-to-isotropic clearing temperature; Δn , birefringence; n_e, extraordinary refractive index; n_o, ordinary refractive index; $\Delta\epsilon$, dielectric anisotropy.

^belastic constants from ¹; T_{NI} from ^{2,3}.

^celastic constants from ^{4,5}; T_{NI} from ².

^delastic constants courtesy of EMD group, Merck KGaA.; T_{NI} from ².

^{b,c,d} Δn , n_e, n_o, and $\Delta\epsilon$ courtesy of EMD group, Merck KGaA.

Supporting Information References

1. Bradshaw, M. J.; Raynes, E. P.; Bunning, J. D.; Faber, T. E., The Frank Constants of Some Nematic Liquid-Crystals. *Journal De Physique* **1985**, 46, (9), 1513-1520.
2. Luk, Y. Y.; Campbell, S. F.; Abbott, N. L.; Murphy, C. J., Non-toxic thermotropic liquid crystals for use with mammalian cells. *Liquid Crystals* **2004**, 31, (5), 611-621.
3. Shah, R. R.; Abbott, N. L., Coupling of the orientations of liquid crystals to electrical double layers formed by the dissociation of surface-immobilized salts. *Journal of Physical Chemistry B* **2001**, 105, (21), 4936-4950.
4. Ambrozic, M.; Formoso, P.; Golemme, A.; Zumer, S., Anchoring and droplet deformation in polymer dispersed liquid crystals: NMR study in an electric field. *Physical Review E* **1997**, 56, (2), 1825-1832.
5. Wu, S. T.; Smith, W. H.; Lackner, A. M., Diamagnetic Anisotropy Measurements of Nematic Liquid-Crystals. *Molecular Crystals and Liquid Crystals* **1986**, 140, (2-4), 83-93.