Electronic Supplementary Material (ESI) for Soft Matter.

A Chiral-Racemic Lyotropic Chromonic Liquid Crystal System (Electronic Supplementary Information)

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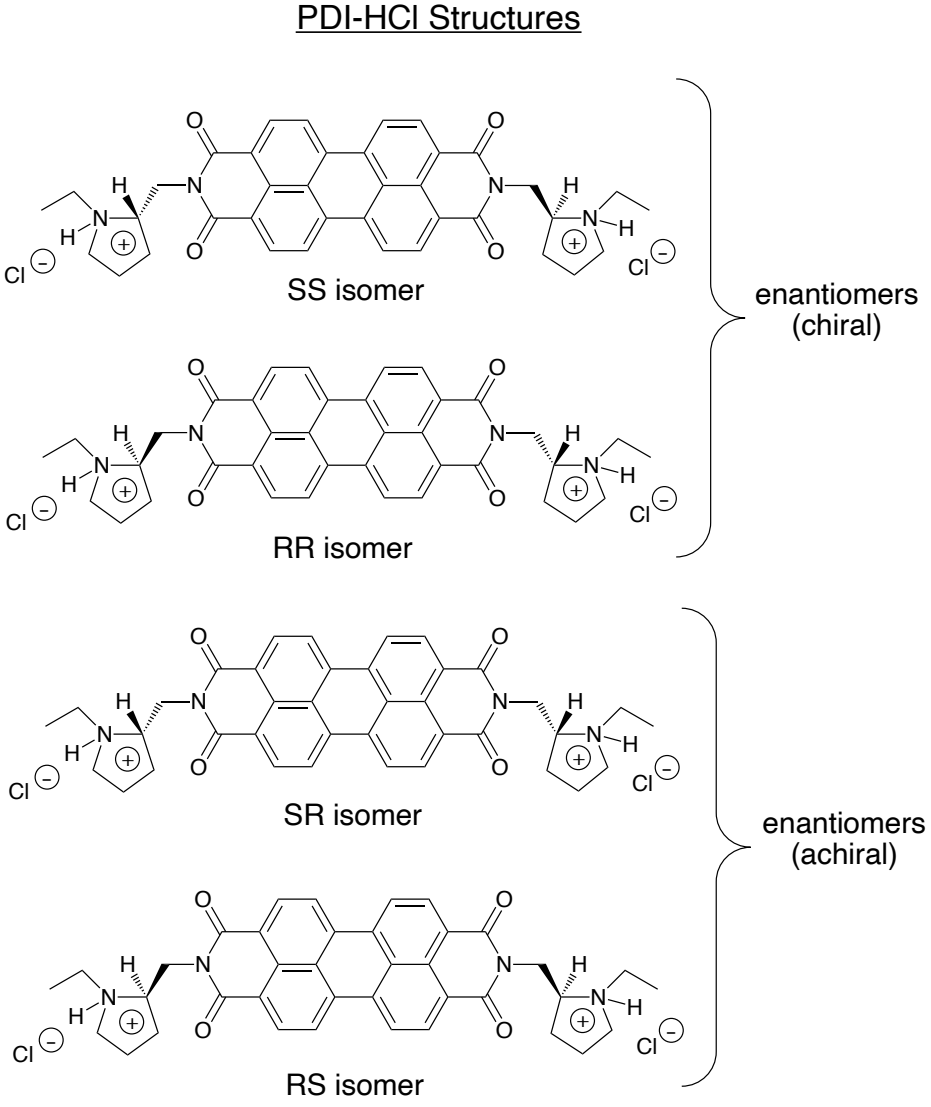

Figure S1: Structures of the four PDI-HCl isomers. The two achiral isomers are the same molecule.

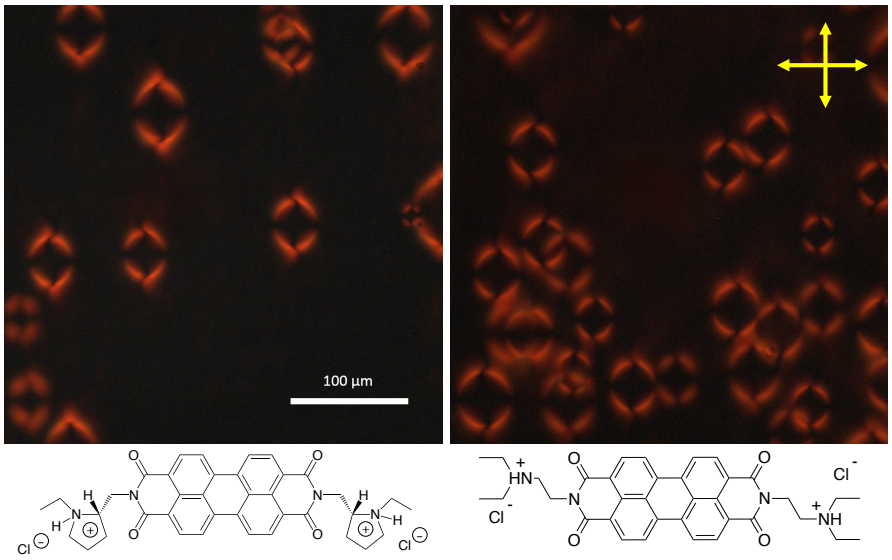

Figure S2: Coexistence region images of isotropic droplets in the nematic phase of 12 wt% racemic-PDI-HCl (left) and 8 wt% achiral perylenetetracarboximide salt[1, 2] (right), with the chemical structures shown below the images. For both images, the director is oriented vertically, the polarizers are crossed as shown by the yellow arrows, and the scales are the same. When solid particles are introduced into achiral chromonic liquid crystals, the perturbations of the nematic liquid crystal around the particles are sometimes "twisted tails" in the region where the director is perpendicular to the particle surface.[3, 4] This is due to the small twist elastic constant in chromonics noted in the introduction section. Perhaps these are present in both images where some of the isotropic droplets non-symmetrically deform the nematic director where it is perpendicular to the droplet surface. If these are "twisted tails", then it is clear that both senses of handedness are present. Also, notice that these regions are similar for droplets of the racemic-PDI-HCl salt and the achiral perylenetetracarboximide salt. For chromonic nematic tactoids surrounded by the isotropic phase, equal numbers of left- and right-handed tactoids are present; but introducing as little as 0.02 wt% of a chiral dopant forces all tactoids to be of the same handedness.[5] So if the non-symmetric regions are "twisted tails," the similar number of both twist senses together with the similarity with an achiral system is further evidence that the racemic-PDI-HCl has an extremely small inverse pitch.

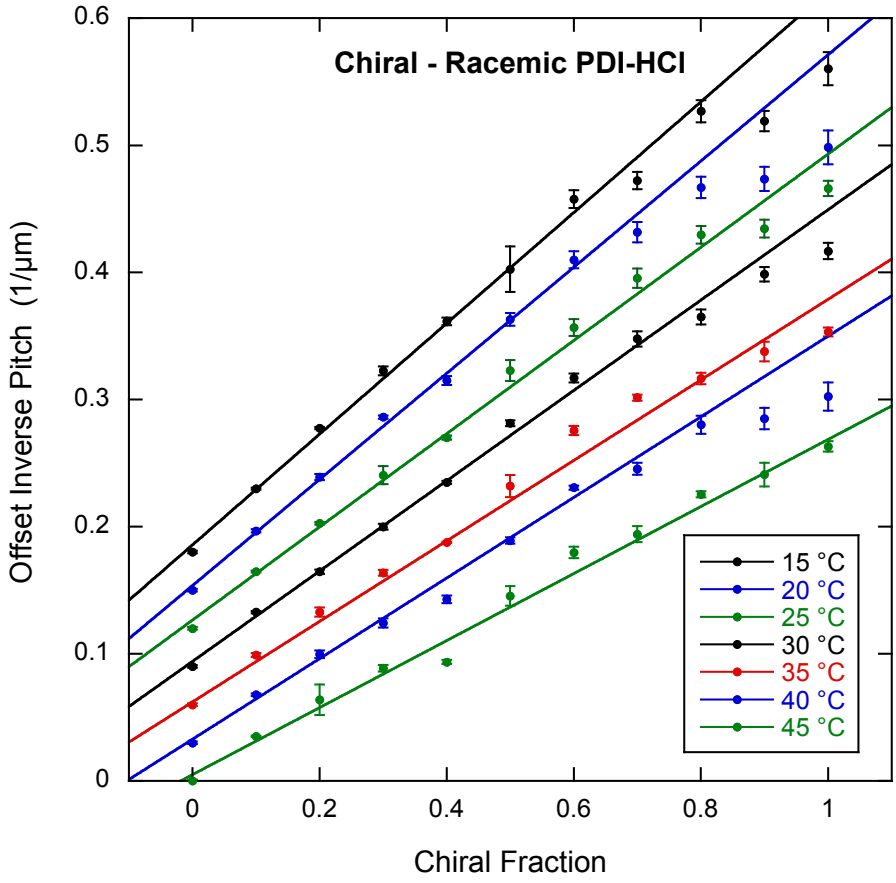

Figure S3: Inverse pitch as a function of chiral fraction with temperature increasing from top to bottom. The inverse pitch values have been offset by 0.03 μm^{-1} between temperatures. The total concentration of racemic- and chiral-PDI-HCl is 12 wt%. The lines are weighted linear least squares fits to the data.

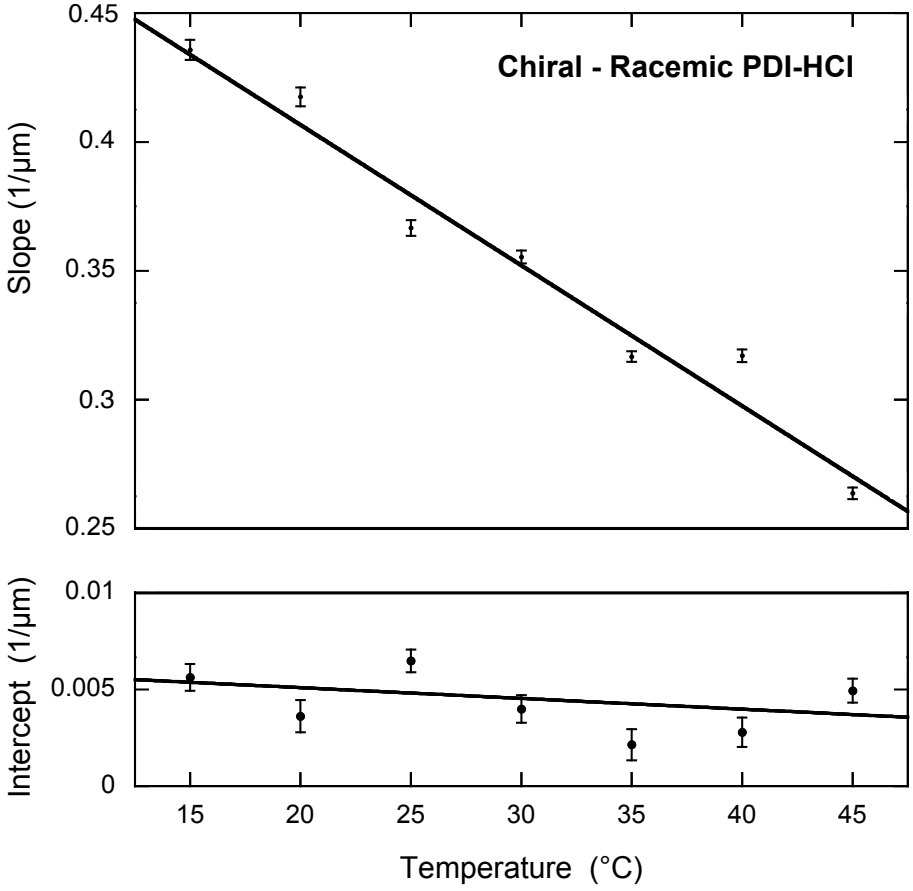

Figure S4: Slope and inverse pitch intercept values for the fits in Fig. 5. The lines are weighted least square linear fits to the data.

References

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