

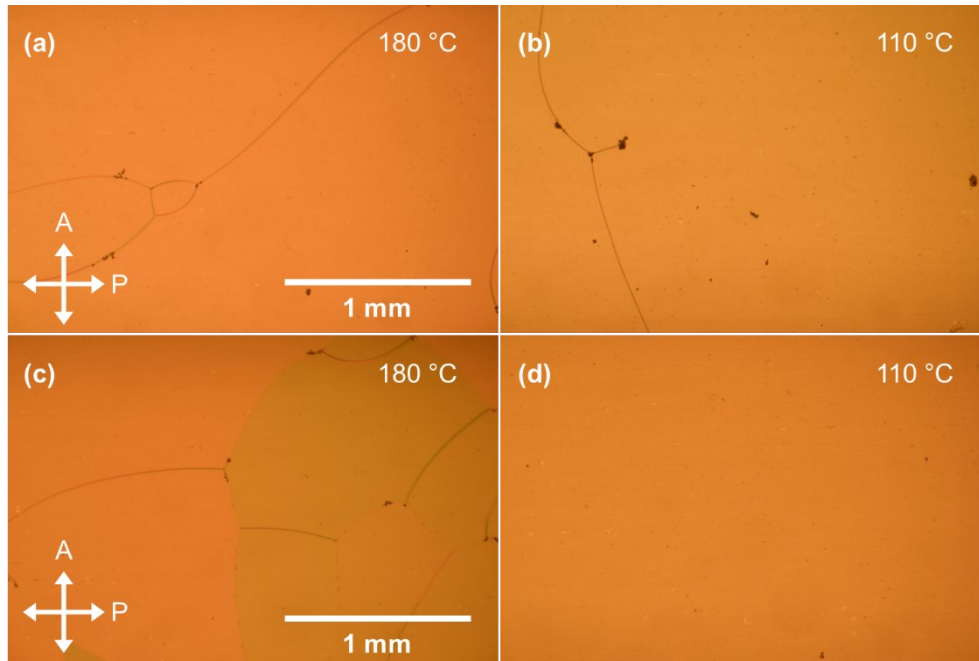
## Supplementary Information

### High-g-Factor Phase-Matched Circular Dichroism of Second Harmonic Generation in Chiral Polar Liquids

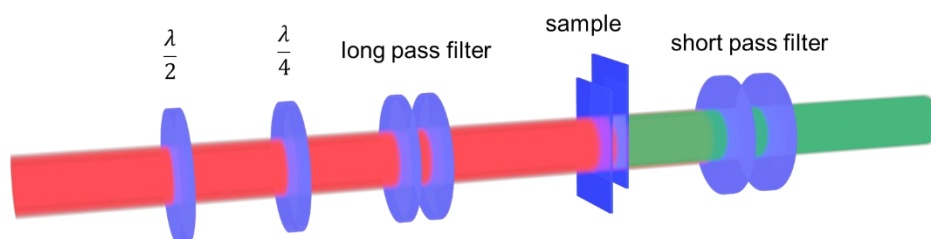
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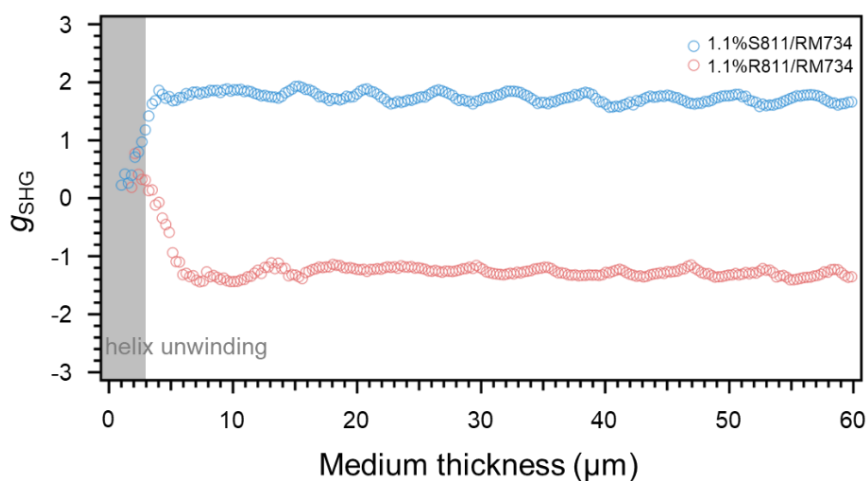
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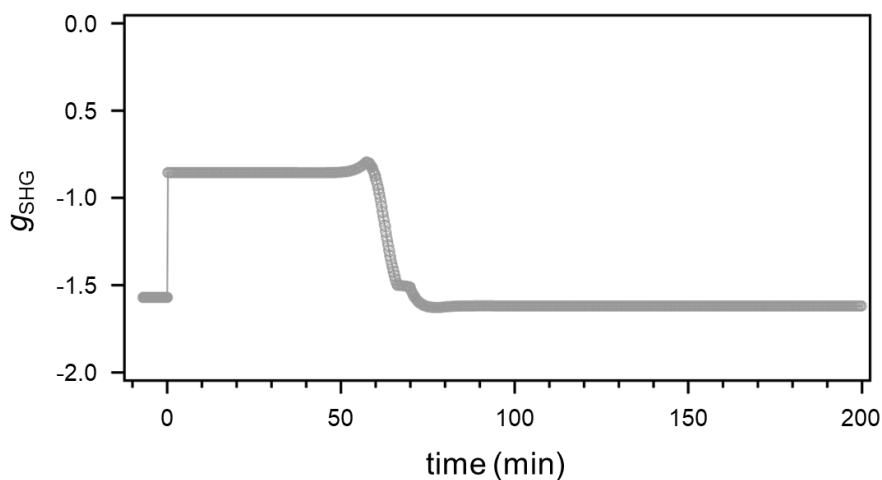
**Fig. S1** The PLM texture of two HN\* in a 50  $\mu\text{m}$  thickness cell. (a) and (b) the texture of 1.1%R811/RM734 at 180  $^{\circ}\text{C}$  and 110  $^{\circ}\text{C}$ , respectively; (c) and (d) the texture of 1.1%S811/RM734 at 180  $^{\circ}\text{C}$  and 110  $^{\circ}\text{C}$ , respectively. The scale bar is 1 mm.



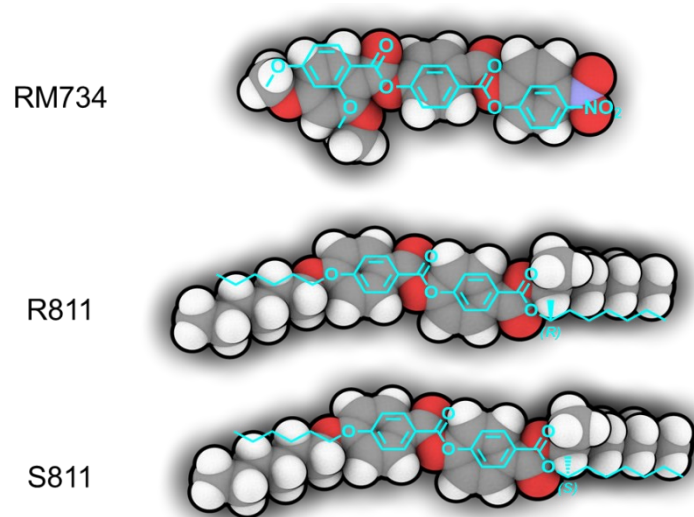
**Fig. S2** The optical path for SHG measurement.  $\lambda/2$  and  $\lambda/4$  represent the half-wave plate and quarter-wave plate, respectively.



**Fig. S3** The thickness dependencies of the  $g$ -factor of right-handed HN\* 1.1%R811/RM734 and left-handed HN\* 1.1%S811/RM734, respectively. The gray part indicates the thinnest part of the wedge-shaped cell (0~3  $\mu\text{m}$ ), where the polarization field is in the unwinding state, and the SHG-CD effect is neglectable. Also, some defects are seen in this area, causing some fluctuations of  $g$ -factor.



**Fig. S4** The  $g$ -factor of 1.1%R811/RM734 under a DC electric field of 1  $\text{mV}/\mu\text{m}$ . The  $g$ -factor is calculated by first smoothing the SH signal under the electric field.



**Fig. S5** Molecular structure of  $N_F$  liquid crystal RM734, chiral dopant R811 and S811.