Synthesis and characterization of a nematic fully aromatic polyester utilizing biphenyl 3,4’-dicarboxylic acid

Supporting Information

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Scheme S1. Hydrolysis of dimethyl 3,4’-bibenzoate (3,4’BB) to synthesize diacid monomer, biphenyl 3,4’-dicarboxylic acid (3,4’BB-COOH), for acidolysis polymerization.

Figure S1. Successful hydrolysis of biphenyl 3,4’-dicarboxylic acid confirmed by $^1$H NMR spectroscopy (DMSO-d$_6$, 400 MHz).
Figure S2. Successful hydrolysis of biphenyl 3,4’-dicarboxylic acid confirmed by $^{13}$C NMR spectroscopy (DMSO-d$_6$, 400 MHz).
**Scheme S2.** Pivalation of hydroquinone with pivalic anhydride yields hydroquinone dipivilate for acidolysis polymerization.

**Figure S3.** Successful pivalation of hydroquinone confirmed through $^1$H and $^{13}$C NMR spectroscopy. Left: Peak assignment and $^1$H NMR (CDCl$_3$, 400 MHz). Right: Peak assignment and $^{13}$C NMR (CDCl$_3$, 400 MHz).
Figure S4. $^1$H NMR (CDCl$_3$;TFA-$d$, 400 MHz) spectroscopy of poly(HQ$_x$-3,4′BB) (top) and poly(HQ$_p$-3,4′BB) (bottom).

Figure S5. Polarized optical microscopy of poly(HQ-3,4′BB) with higher molecular weight due to receiving 30 m of vacuum during the polymerization reveals possible mosaic nematic texture birefringence. Both sets of images were taken during a slow cool at 10 °C/min from the isotropic phase. A) poly(HQ$_p$-3,4′BB) B) poly(HQ$_x$-3,4′BB).
**Orientation procedure:**

1) Equilibrate at 310 °C for 10 s
2) Draw for 50 s at a rate of 0.5 mm/s from 5 mm to 25 mm at 310 °C
3) Quench cool to room temperature

**Figure S6.** 2D WAXS profile of poly(HQ<sub>p</sub>-3,4’BB) after attempts to orient the polymer below the \( T_g \) resulting in crystallization.