

SUPPLEMENTARY INFORMATION

Bulk Thermally Conductive Polyethylene as Thermal Interface Materials

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Characterization:

Tensile experiments (ZwickRoell Z010) were performed for samples at draw ratios of 0 (PE preform), 25, and 40 along the drawing direction under room temperature. Young's Modulus for each sample was determined by extracting the slope of a linear fitting line of the stress Vs. strain curve as presented in Fig. S1. A constant crosshead speed of 10 mm min⁻¹ and room temperature were applied to complete all the tensile experiments.

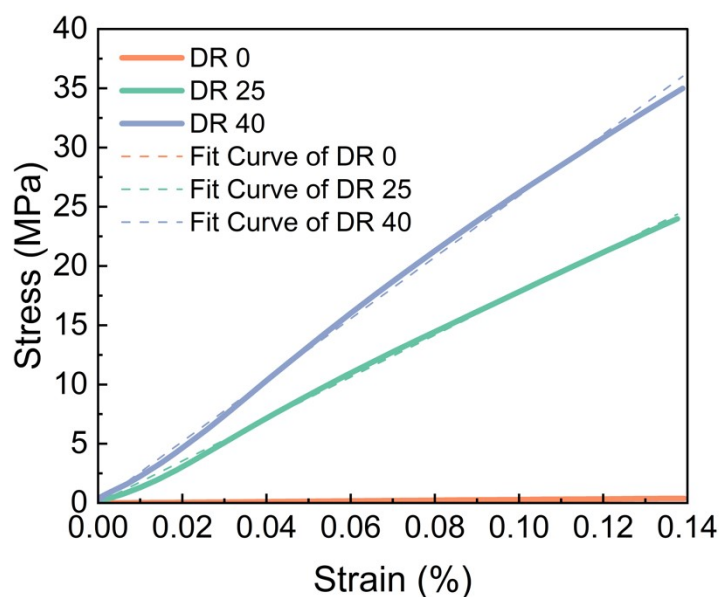


Figure S1: Stress Vs. strain curve used for Young's modulus calculation.

Coefficient of thermal expansion (CTE) was measured by running thermal expansion experiments (TA Instruments Q400EM Thermomechanical Analysis). Dimension change of material as a function of temperature for samples at draw ratio of 0 (PE preform), 25, and 37 were plotted in Fig. S2. Heating rate for all experiments is 10 °C min⁻¹.

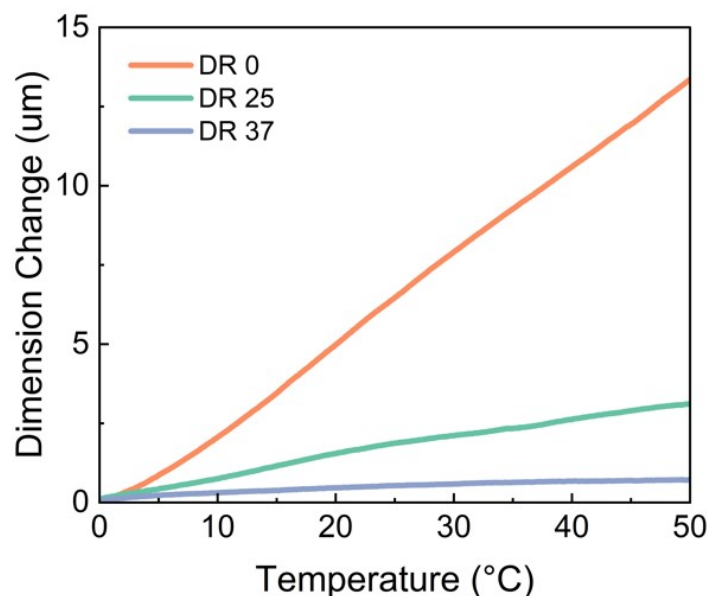


Figure S2: Dimension change of samples along the drawing direction as a function of temperature used for CTE calculation.

Melting temperature (T_m) and degradation temperature (T_d) of PE at draw ratio 0 (preform) and 37 were measured by utilizing differential scanning calorimeter (DSC) (TA Instruments DSC Auto 2500) and thermogravimetric analyzer (TGA) (TA Instruments 5500), respectively. For DSC experiments, we ran the heat-cool-heat experiment with a heating rate of $10\text{ }^{\circ}\text{C min}^{-1}$ and a cooling rate of $5\text{ }^{\circ}\text{C min}^{-1}$. For TGA experiments, we set the heating rate to $5\text{ }^{\circ}\text{C min}^{-1}$, and the furnace environment to be nitrogen to avoid the influence from oxidation. T_m was determined from the heat flow versus temperature graph output by the DSC as shown in Fig. S3a-b. The initial degradation temperature (T_{d1}) and degradation temperature at the maximum weight loss (T_{d2}) were extracted from the weight loss versus temperature graph produced by the TGA as shown in Fig. S3c-d.

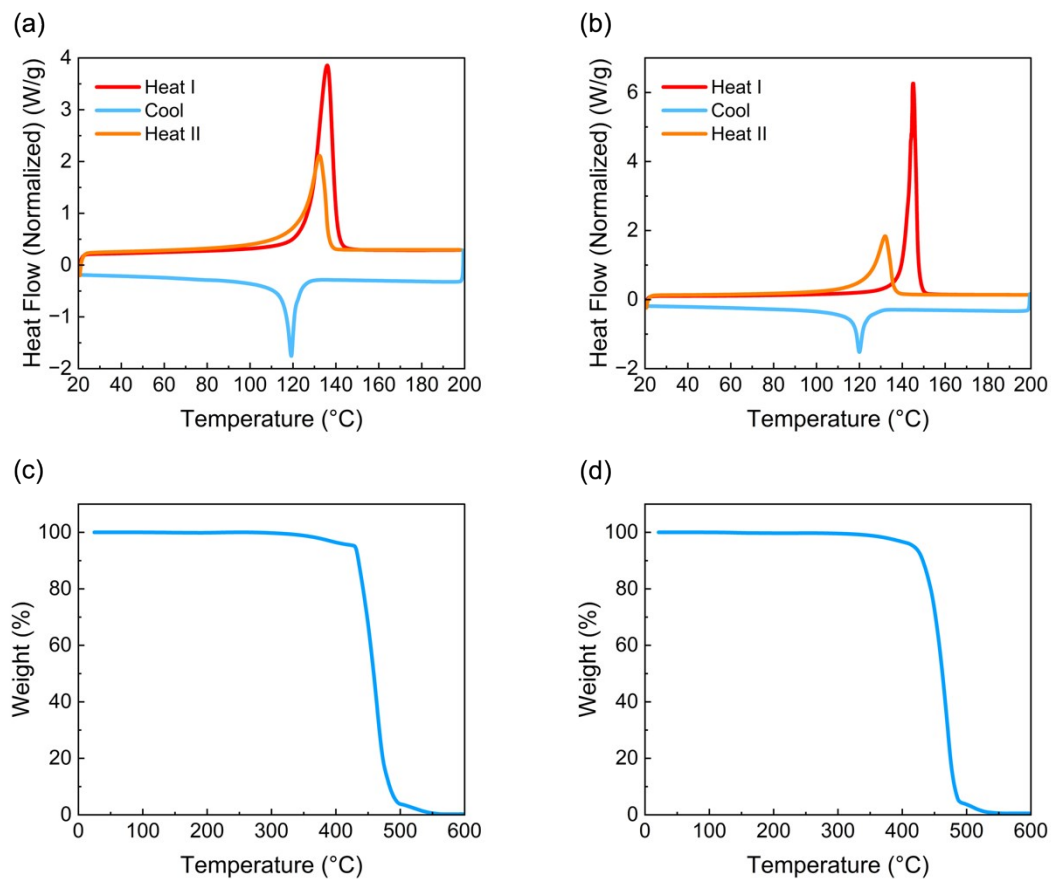


Figure S3: (a) DSC for undrawn PE preform; (b) DSC for PE at draw ratio of 37; (c) TGA for undrawn PE preform; (d) TGA for PE at draw ratio of 37.