

Supporting information for

Melt memory in random ethylene-1-alkene copolymers

Yunxiang Shi¹, Jingqing Li¹, Hongfei Li^{*2}, Bin Zhang^{*3}, Jesper de Claville
Christiansen⁴, Donghong Yu^{*5} and Shichun Jiang^{*1}

¹School of Materials Science and Engineering, Tianjin University, Tianjin 300072, PR
China

²State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of
Applied Chemistry, Chinese Academy of Sciences, Changchun, 130022, PR China

³School of Materials Science & Engineering, Zhengzhou University, Zhengzhou
450001, PR China

⁴Department of Materials and Production, Aalborg University, DK-9220, Aalborg East,
Denmark

⁵Department of Chemistry and Bioscience, Aalborg University, DK-9220, Aalborg
East, Denmark

* Authors for correspondence: hfli@ciac.ac.cn, binzhang@zzu.edu.cn, yu@bio.aau.dk,
scjiang@tju.edu.cn

Samples synthesis:

The polymerization reaction was carried out in a 200 mL reaction flask equipped with a glass stirrer, gas inlet, and feeding port. The reaction temperature was controlled using a super thermostatic bath. Prior to polymerization, the reaction apparatus was heated in an electric oven for 0.5 hours, vacuumed, purged with argon gas, allowed to cool to room temperature, and finally pressurized with ethylene gas to fill the reaction flask. The needles and syringes required for the polymerization reaction have been dried in a vacuum oven, cooled naturally, and then stored in a desiccator. Before feeding, the syringe was washed several times with argon gas, followed by stepwise addition of solvent, cocatalyst, and comonomer. The reaction mixture was then transferred to a pre-set constant temperature water bath, the main catalyst was added, and stirring was initiated to calculate the reaction time. After polymerization was complete, the product was poured into ethanol containing hydrochloric acid to decompose any catalyst residues, filtered, washed with alcohol, placed in a vacuum drying oven, dried at 50 °C for 8 hours, and weighed to determine the yield.

Molecular weights of the copolymers were determined by using Gel Permeation Chromatography with ortho-dichlorobenzene as the solvent at a column temperature of 135 °C. Fourier Transform Infrared spectrometer and Nuclear Magnetic Resonance spectrometer were performed to characterize the co-units of each sample. Samples were dissolved in a 1:1 mixture of ortho-dichlorobenzene and deuterated ortho-dichlorobenzene to form a 15-20% (w/v) solution, tested in a 10 mm tube at 120 °C.

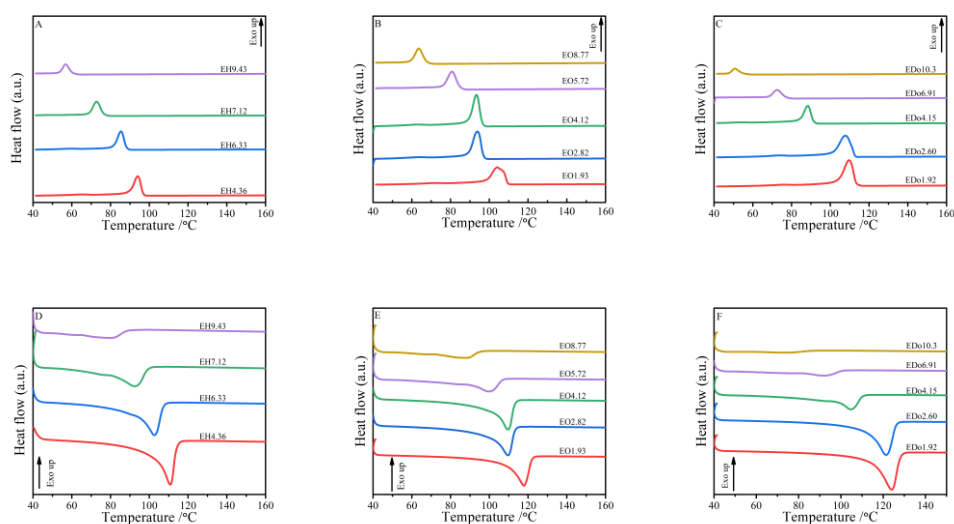


Fig. S1 DSC cooling (top) and subsequent heating curves (bottom) of ethylene-1-alkene copolymers. Both the cooling and heating rates are 10 °C/min.

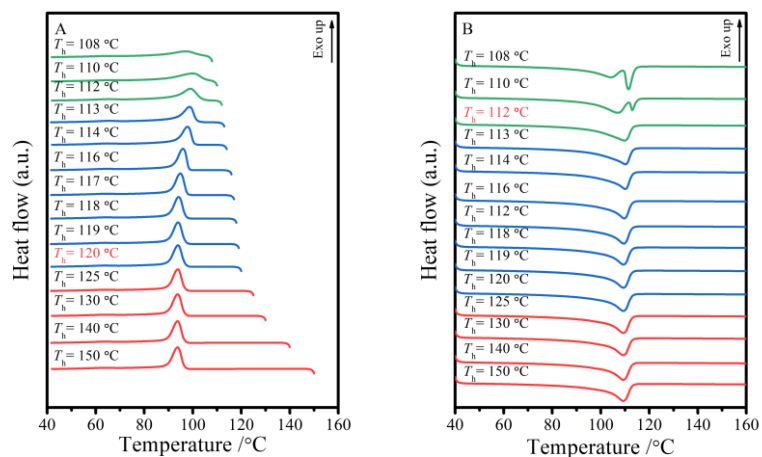


Fig. S2 DSC (A) cooling curves for EO2.82 after 5 min at the indicated T_h ; (B) subsequent heating curves.

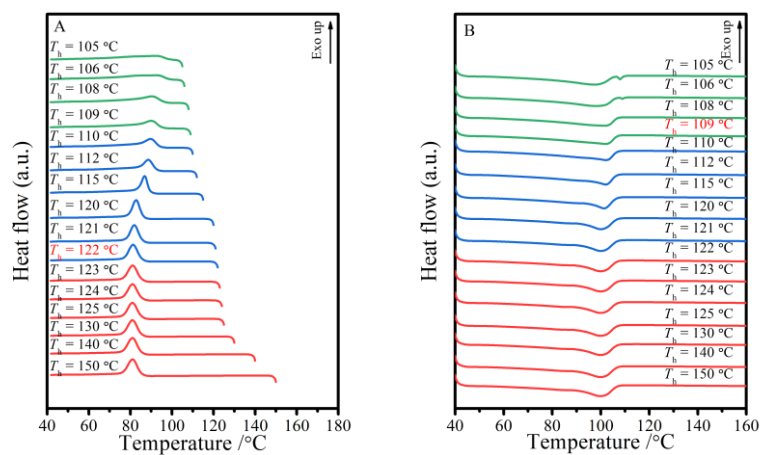


Fig. S3 DSC (A) cooling curves for EO5.72 after 5 min at the indicated T_h ; (B) subsequent heating curves.

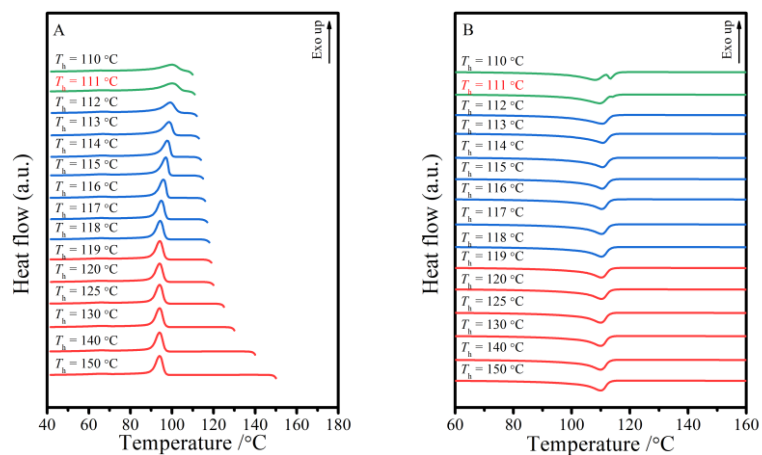


Fig. S4 DSC (A) cooling curves for EH4.36 after 5 min at the indicated T_h ; (B) subsequent heating curves.

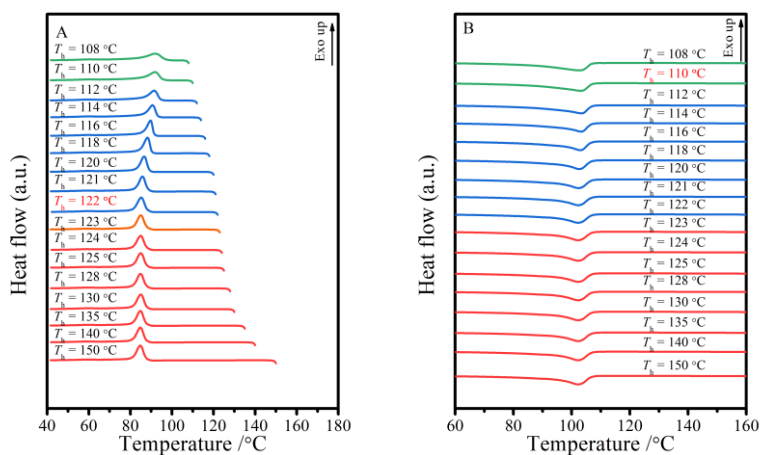


Fig. S5 DSC (A) cooling curves for EH6.33 after 5 min at the indicated T_h ; (B) subsequent heating curves.

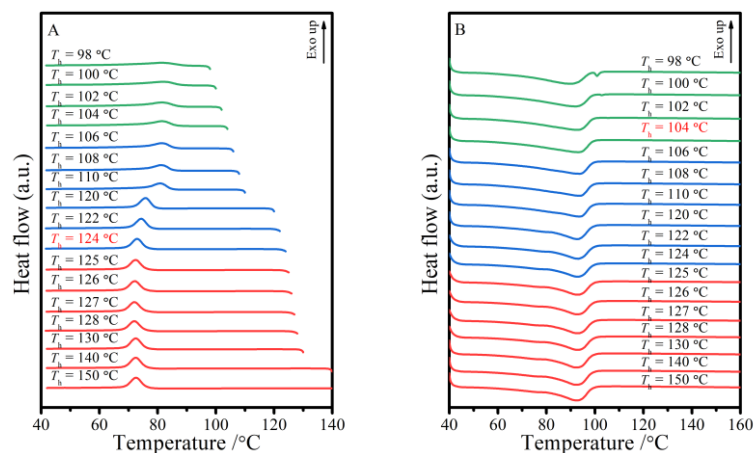


Fig. S6 DSC (A) cooling curves for EH7.12 after 5 min at the indicated T_h ; (B) subsequent heating curves.

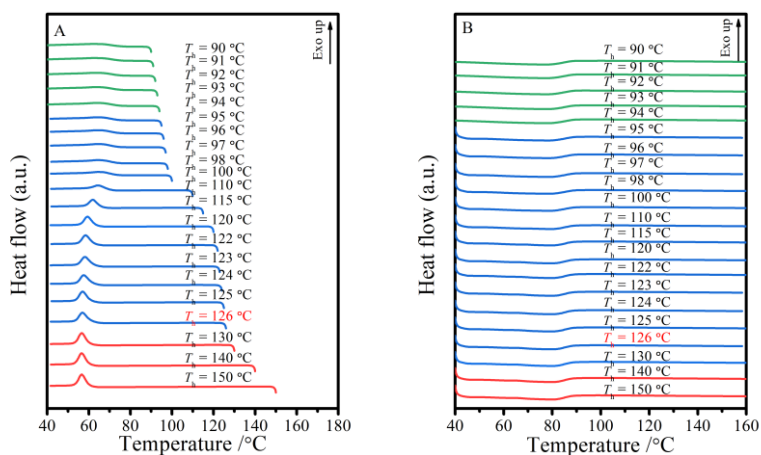


Fig. S7 DSC (A) cooling curves for EH9.43 after 5 min at the indicated T_h ; (B) subsequent heating curves.

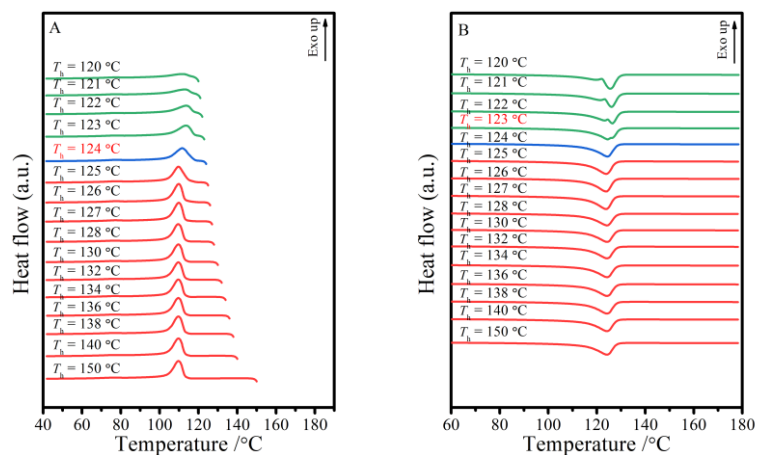


Fig. S8 DSC (A) cooling curves for EDo1.92 after 5 min at the indicated T_h ; (B) subsequent heating curves.

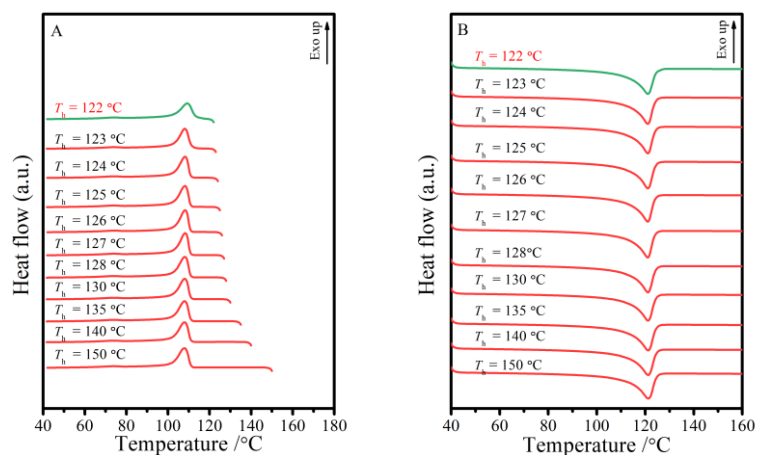


Fig. S9 DSC (A) cooling curves for EDo2.60 after 5 min at the indicated T_h ; (B) subsequent heating curves.

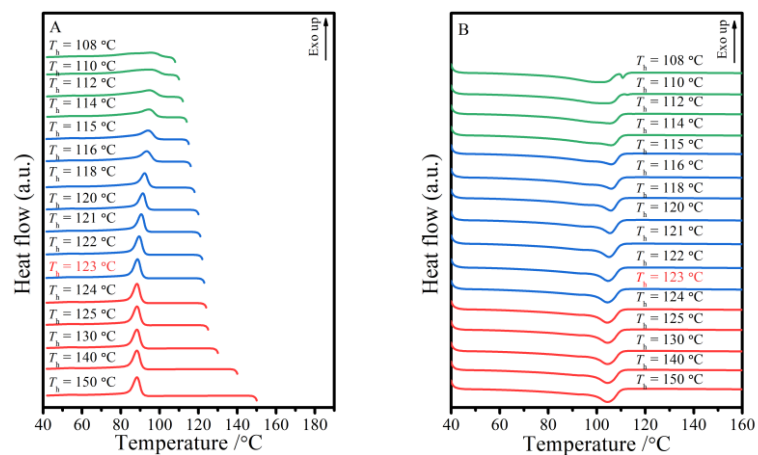


Fig. S10 DSC (A) cooling curves for EDo4.15 after 5 min at the indicated T_h ; (B) subsequent heating curves.

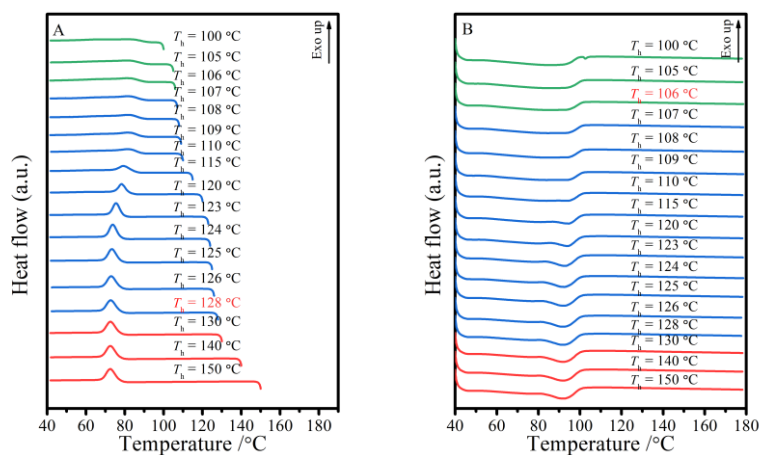


Fig. S11 DSC (A) cooling curves for EDo6.91 after 5 min at the indicated T_h ; (B) subsequent heating curves.

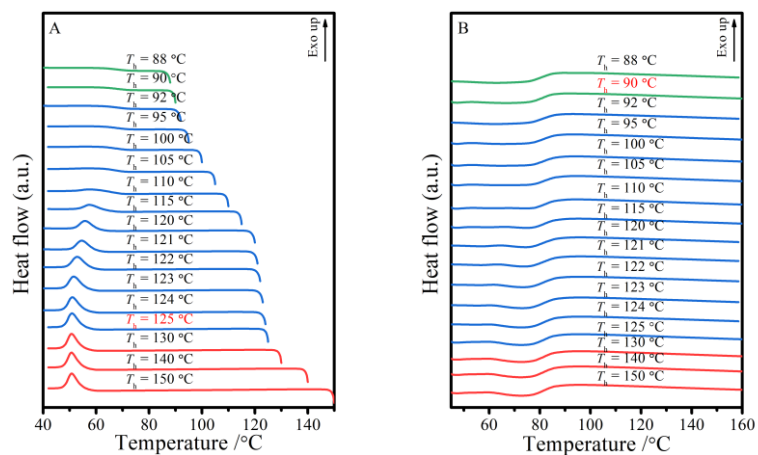


Fig. S12 DSC (A) cooling curves for EDo10.3 after 5 min at the indicated T_h ; (B) subsequent heating curves.