

Supporting information

Stabilization of nuclei of lamellar polymer crystals: Insights from a comparison of the Hoffman-Weeks line with the crystallization line

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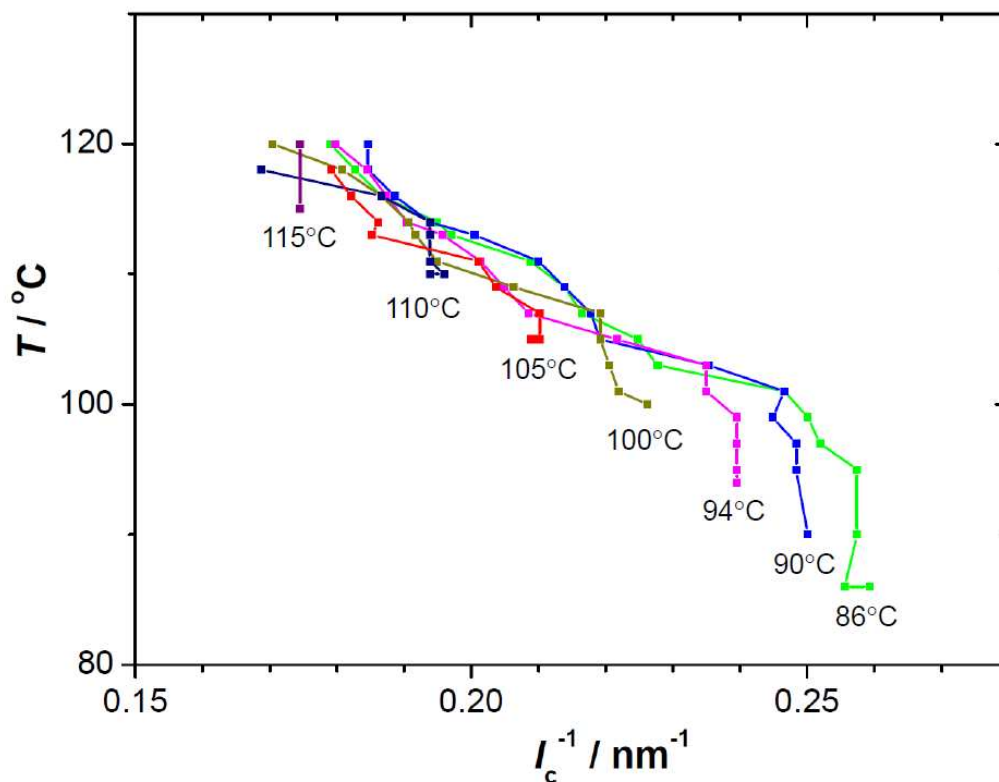


Figure S1. Variation of the reciprocal of lamellar thickness measured by *in situ* SAXS during heating. The temperatures in the figure indicate the isothermal crystallization temperature of poly(butylene succinate) before heating. The sample was kept at the corresponding temperature for 2 minutes before the measurement was performed and the measurement took 8 minutes at each temperature. Due to the slow heating, considerable lamellar thickening was observed, which could be attributed to melting-recrystallization.

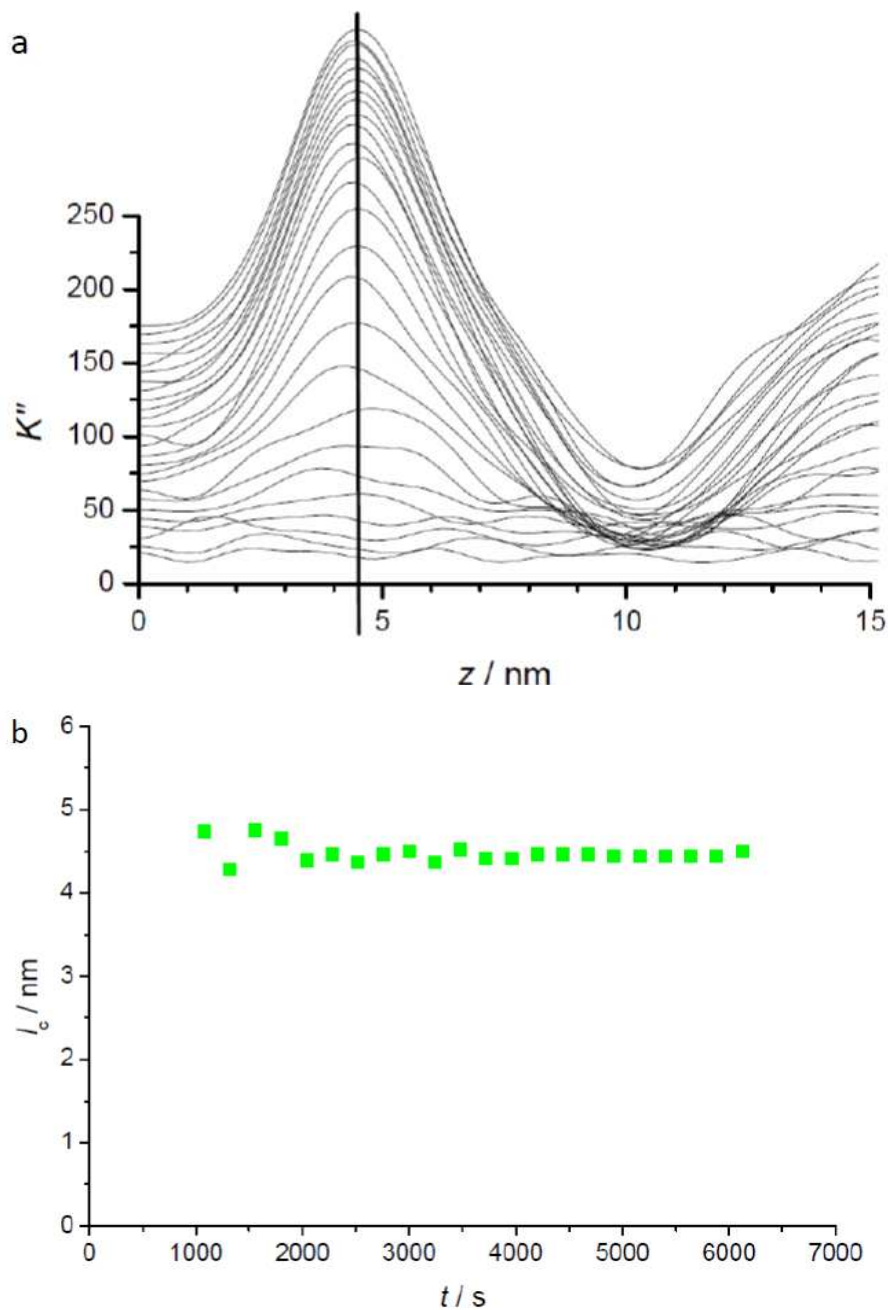


Figure S2. Variation of the interface distribution function $K''(z)$ with various periods of time, with a time spacing of 250 s (a) and the lamellar thickness (b) with time measured by *in situ* SAXS during isothermal crystallization of pure poly(butylene succinate) at 100 °C. Each curve in (a) corresponds to a data point in (b). It shows that within the studied crystallization time of 1 hour lamellar thickening did not occur once the lamellar crystals were formed.

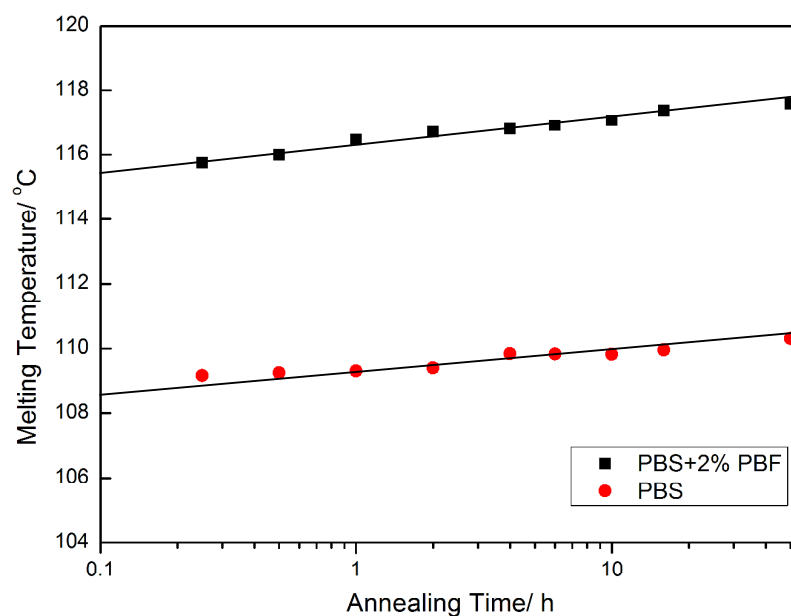


Figure S3. Variation of the melting peak temperature of pure poly(butylene succinate) isothermally crystallized at 100 °C (red dots) and nucleated poly(butylene succinate) crystallized at 110 °C (black squares) with prolonged crystallization time. When the isothermal crystallization time is less than 48 h, the increase of melting peak temperature is less than 2 °C. In the main text, the isothermal crystallization time of the samples used for determination of melting point was around 2 hours. Thus, the increase of melting point was less than 1°C.

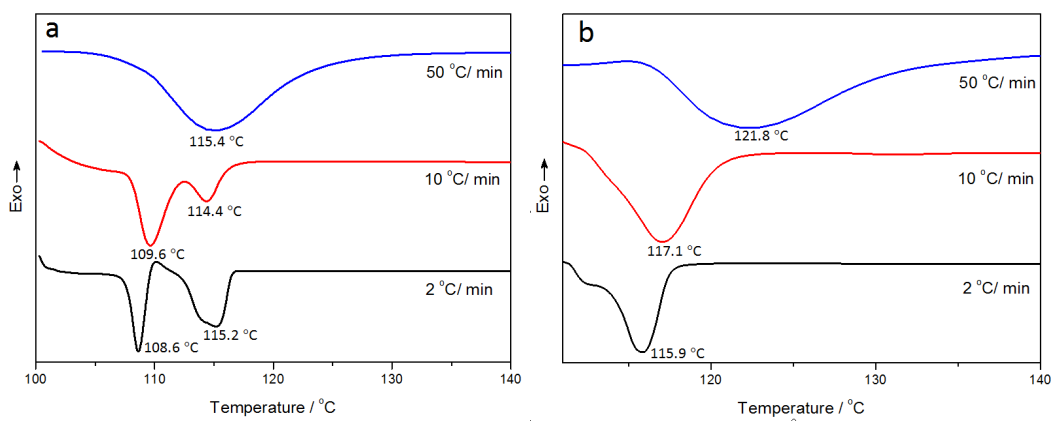


Figure S4. DSC curves of the melting of pure poly(butylene succinate) isothermally crystallized at 100 °C for 4h (a) and nucleated poly(butylene succinate) crystallized at 110 °C for 4h (b) with various heating rates using the standard DSC. It is seen that the melting peak of the recrystallized lamellar crystals became weaker with increasing heating rate. When the heating rate was 50 °C/min, the process of recrystallization and remelting disappeared. Due to the kinetics of melting, the peak temperature of the first endotherm increased slightly when the heating rate increased from 2 to 10 °C/min.

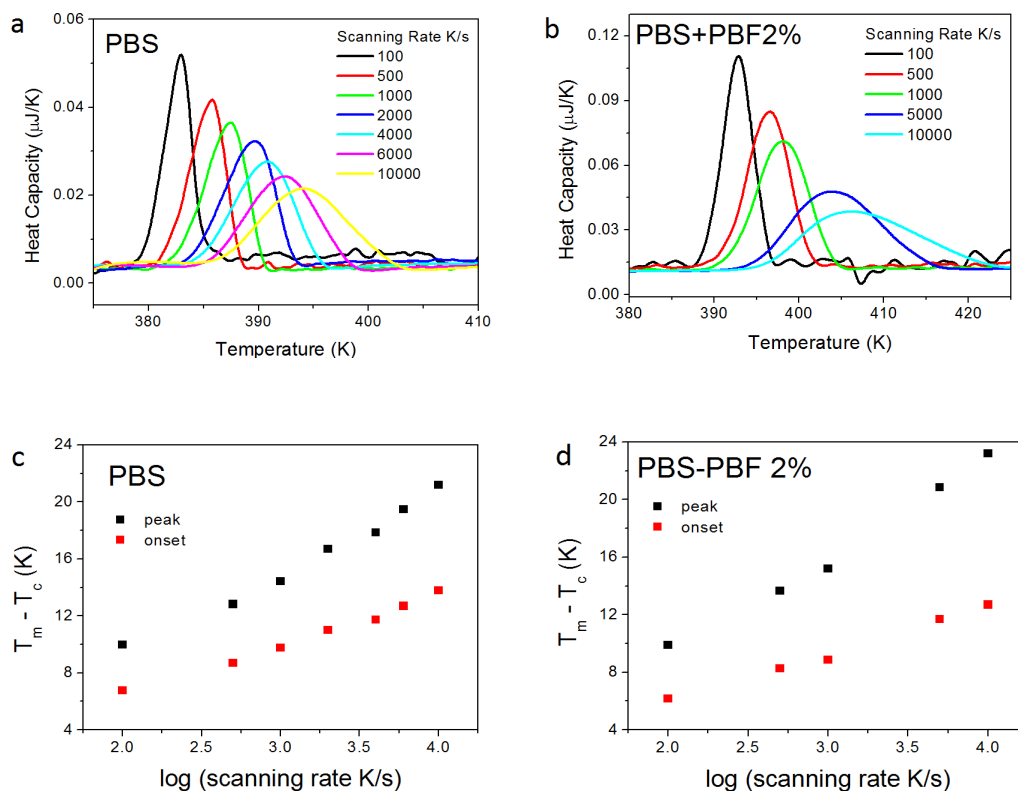


Figure S5. Variation of the melting process of pure poly(butylene succinate) isothermally crystallized at 100 °C (a, c) and nucleated poly(butylene succinate) crystallized at 110 °C (b, d), determined with various heating rates using the ultrafast DSC. The recrystallization disappeared when the heating rate was sufficiently fast. Attributed to the kinetics of crystal melting, both, the onset and peak melting temperature increased with increasing heating rate.