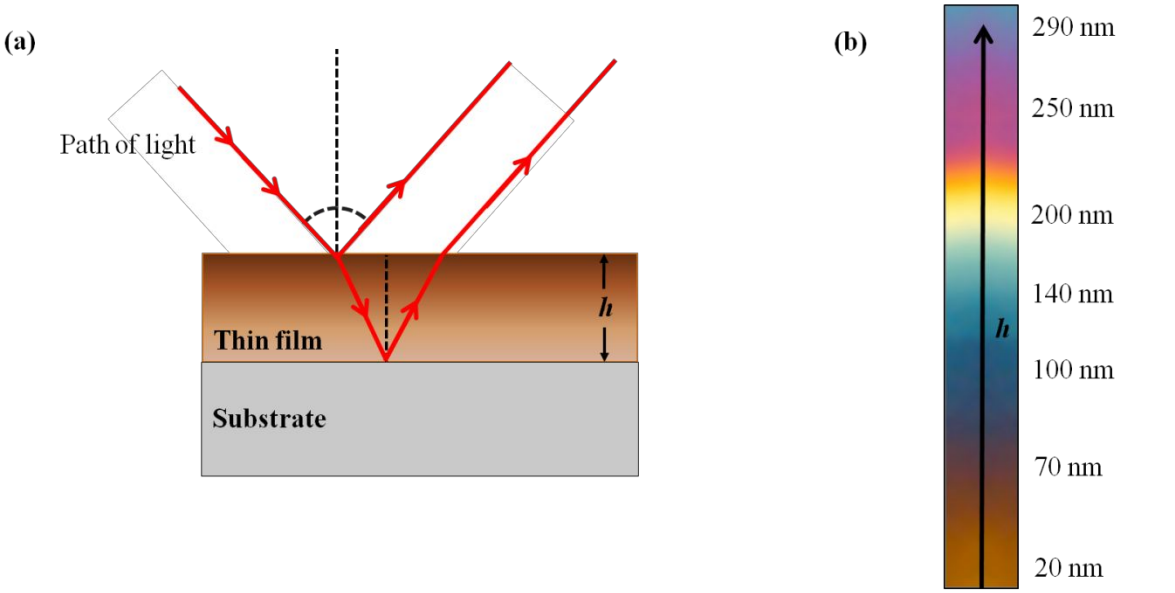
Supporting information for:

Growth Kinetics of Stacks of Lamellar Polymer Crystals

Sumit Majumder[1], Hanna Busch[2], Purushottam Poudel[1],
Stefan Mecking[2] and Günter Reiter[1,3,*]

[1]Institute of Physics, University of Freiburg, 79104 Freiburg, Germany
[2] Department of Chemistry, University of Konstanz, 78457 Konstanz, Germany
[3]Freiburg Materials Research Center (FMF), University of Freiburg, 79104 Freiburg, Germany

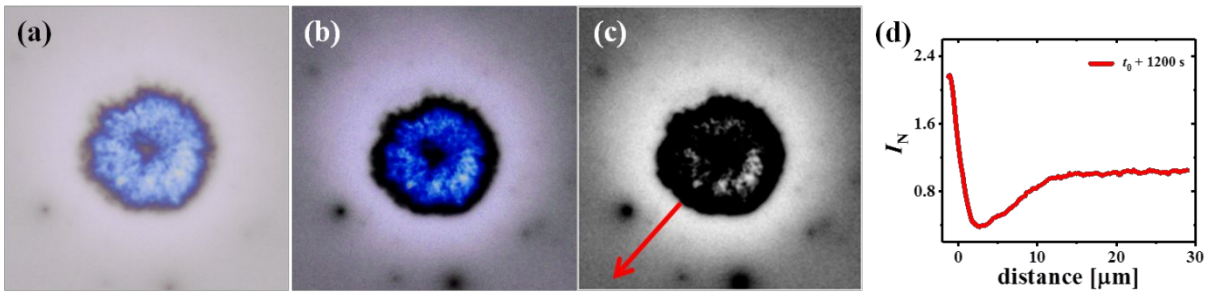
1) Correlation between film thickness and interference colors



Observed interference colors for isotactic polystyrene films

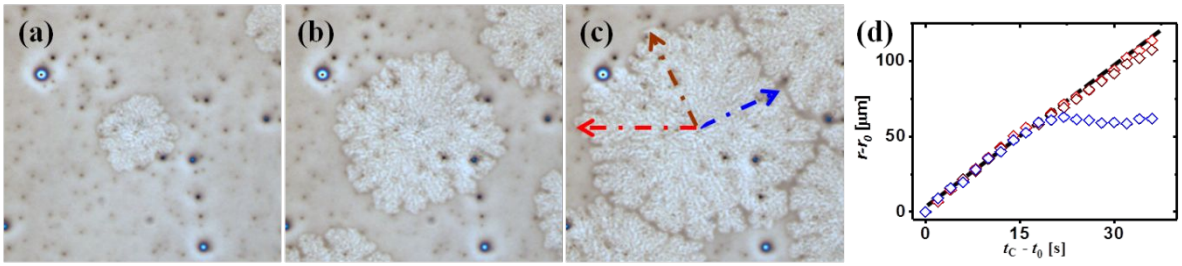
S1: (a) Schematic representation of interference of white light reflected from a supported thin film. (b) Color bar indicating the relation between interference colors and film thickness (***h***) as observed for isotactic polystyrene films [1].

2) Grey scale intensity measurement for calculating width of depletion zone



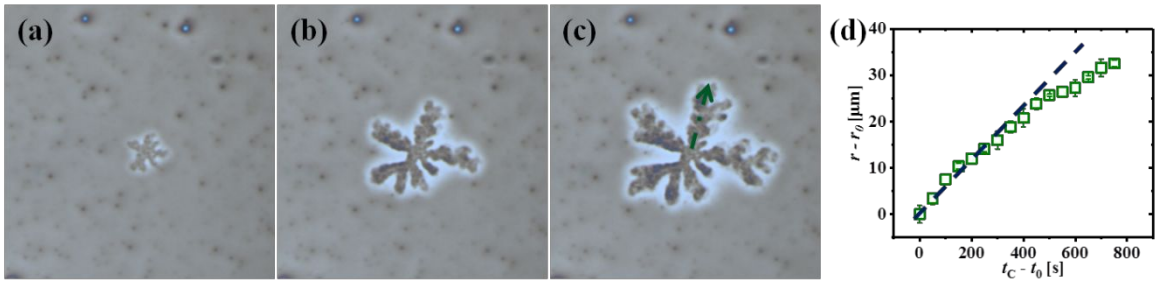
S2: (a) Contrast enhanced optical micrograph showing a crystal formed in a $h \approx 35$ nm thin film after t_0 + 1200 s at 71 °C. (b) Contrast enhanced further to visualize the depletion region surrounding the crystal. (c) Grey scale image of (b). (d) Normalized inverse grey scale intensity (I_N) profile along the red line indicated in (c). The intensity values were normalized by the intensity value of the unperturbed film. The images (a) - (c) have a size of 55×55 μm^2.

3) *In-situ* measurement of radial advancement of a crystal at 67 °C



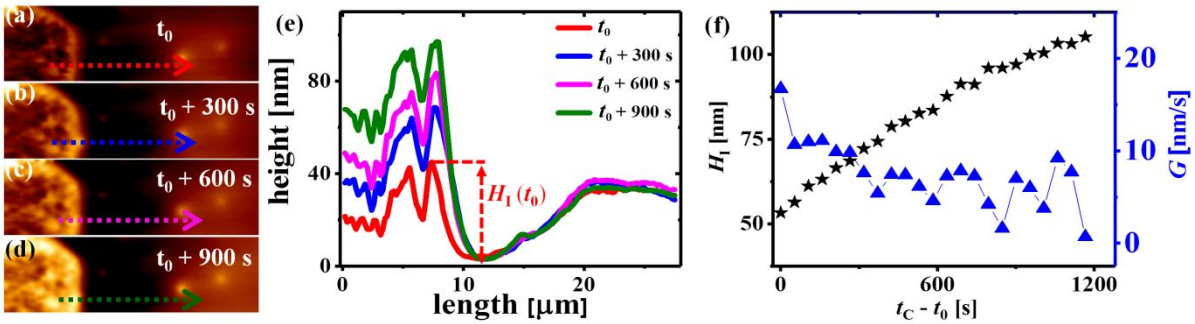
S3: Contrast enhanced optical micrographs showing the temporal evolution of crystals formed in an $h \approx 35$ nm thin film. The branched crystal in (a)-(c) was grown at 67 °C and the crystallization times, t_C, were t_0, t_0 + 15 s and t_0 + 30 s, respectively. (d) Lateral advancement ($r - r_0$) of the branched crystal as a function of ($t_C - t_0$). The black dashed line indicates the initial slope of ($r - r_0$) with ($t_C - t_0$). The images (a)-(c) have a size of 300×300 μm^2.

4) *In-situ* measurement of radial advancement of a crystal at 69 °C



S4: Optical micrographs showing temporal evolution of crystals formed in an $h \approx 35$ nm thin film. The branched crystal in (a)-(c) was grown at 69 °C and the crystallization times, t_C, were t_0, t_0 + 400 s and t_0 + 800 s, respectively. (d) Lateral advancement of the branched crystal as a function of (t_C - t_0). The blue dashed line indicates the initial slope of (r - r_0) with (t_C - t_0). The images (a)-(c) have a size of 280×280 µm^2.

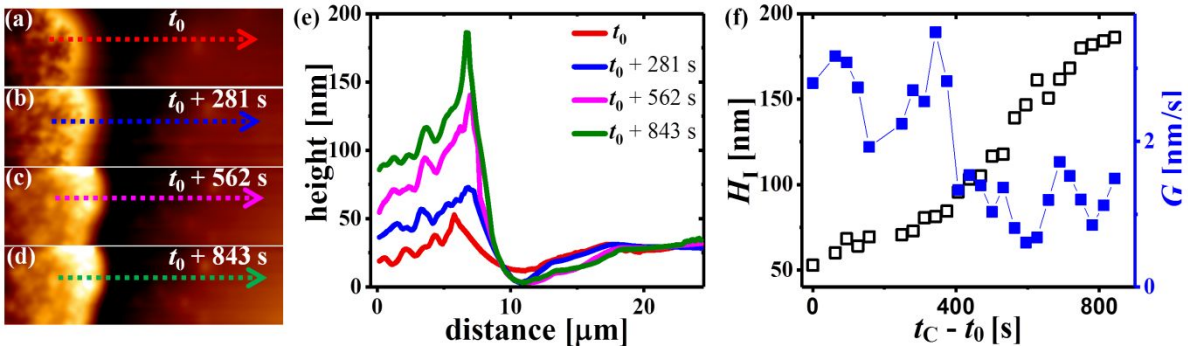
5) AFM *in-situ* measurement of radial advancement and height of a crystal at 70 °C



S5: (a) – (d) AFM *in-situ* height images showing growth of a crystal at 70 °C in *ca.* 35 nm thin film after t_0, t_0 + 300 s, t_0 + 600 s and t_0 + 900 s, respectively. (e) Height profile along the arrows indicated in (a) – (d). (f) Height of the crystal growth front (H_1) and lateral growth rate (G) as a

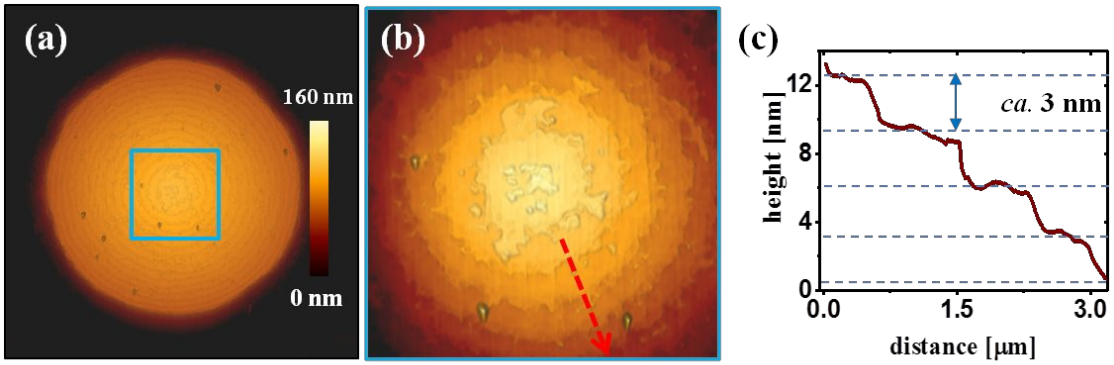
function of (t_C - t_0), obtained from *in-situ* measurements. The images (a)-(d) have a size of 48×14 μm^2.

6) AFM *in-situ* measurement of radial advancement and height of a crystal at 71 °C



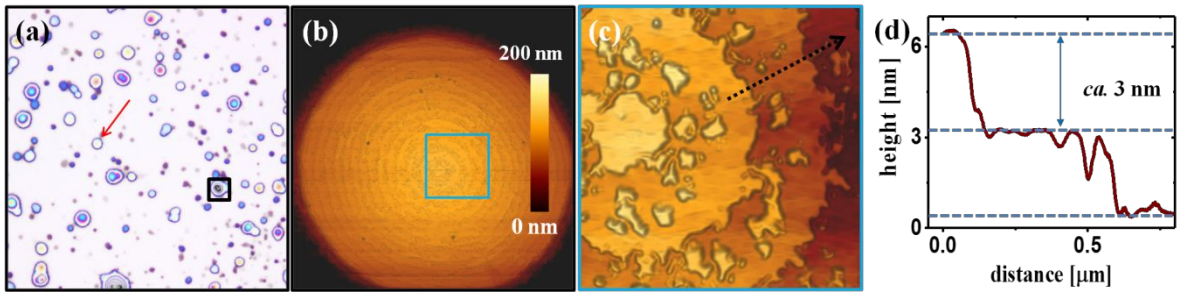
S6: (a) – (d) AFM *in-situ* height images showing growth of a crystal at 71 °C in *ca.* 35 nm thin film after t_0, t_0 + 281 s, t_0 + 562 s and t_0 + 843 s, respectively. (e) Height profile along the arrows indicated in (a) – (d). (f) Height of the crystal growth front (H_1) and lateral growth rate (G) as a function of (t_C - t_0), obtained from *in-situ* measurements. The images (a)-(d) have a size of 32×9 μm^2.

7) Height profile of a stack of lamellar crystals



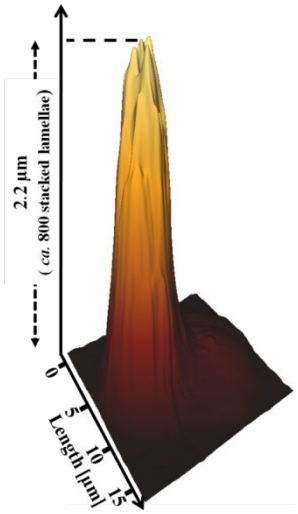
S7: (a) AFM topography image of the crystal indicated by the red box in Figure 6 (d) in main manuscript. (b) AFM topography image of the part indicated by the sky-blue box in (a), showing stacks of lamellae. (c) Height profile along the red dotted line indicated in (b). (a) and (b) have a size of 35 × 35 μm^2 and 9 × 9 μm^2, respectively.

8) Height profile of a stack of lamellar crystals



S8: (a) Optical micrograph presented in Figure 6 (g) in the main manuscript. (b) AFM topography image of the crystal indicated by the red arrow in (a). (c) AFM topography image of the part indicated by the sky-blue box in (b), showing stacks of lamellae. (d) Height profile along the black dotted line indicated in (c). The images (a), (b) and (c) have a size of 200 × 200 μm^2, 11 × 11 μm^2 and 1.6 × 1.6 μm^2, respectively.

9) Micrometer high quasi-single crystal



S9: AFM 3D image of the crystal shown in Figure 6 (h) in main text (indicated by the black box in Figure S8 (a)).

Reference:

(1) Schäffer, E. Instabilities in Thin Polymer Films: Structure Formation and Pattern Transfer, Universität Konstanz, 2001.