

Supporting Information

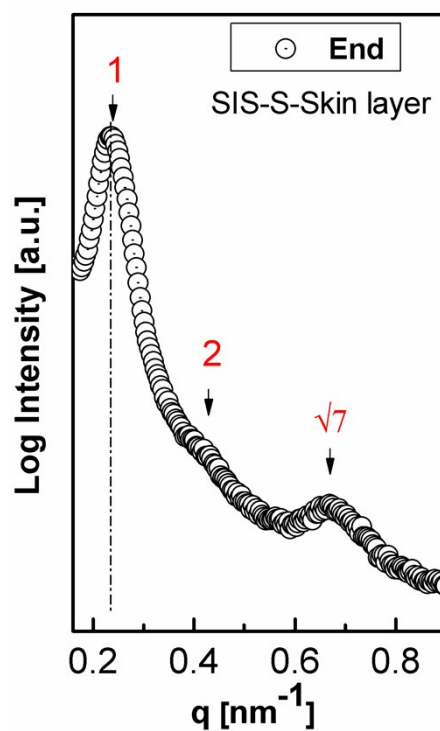


Figure S1.1d-SAXS curve for skin layer of SIS-S representing cylindrical structure with reflections at $1:\sqrt{3}:2:\sqrt{7}$. (Note: the peaks at $\sqrt{3}q^*$ and $2q^*$ are close and cannot be clearly distinguished.)

The d-spacing can be calculated from $d=2\pi/q^*$ as 27.1nm.

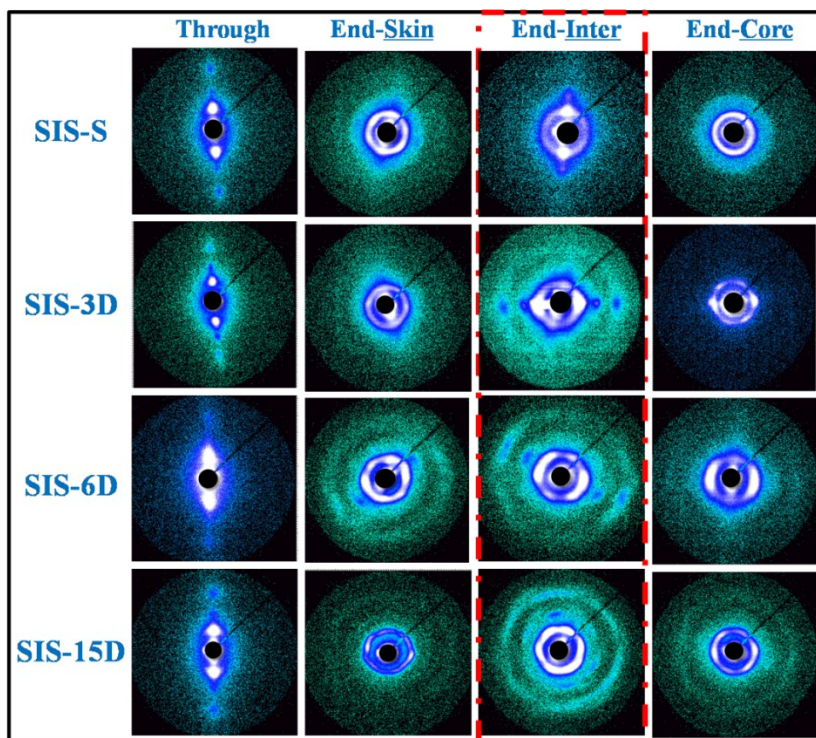


Figure S2. Summary of 2d-SAXS patterns for different layers of samples along the neutral direction (ND), transverse direction (TD) and flow direction (FD).

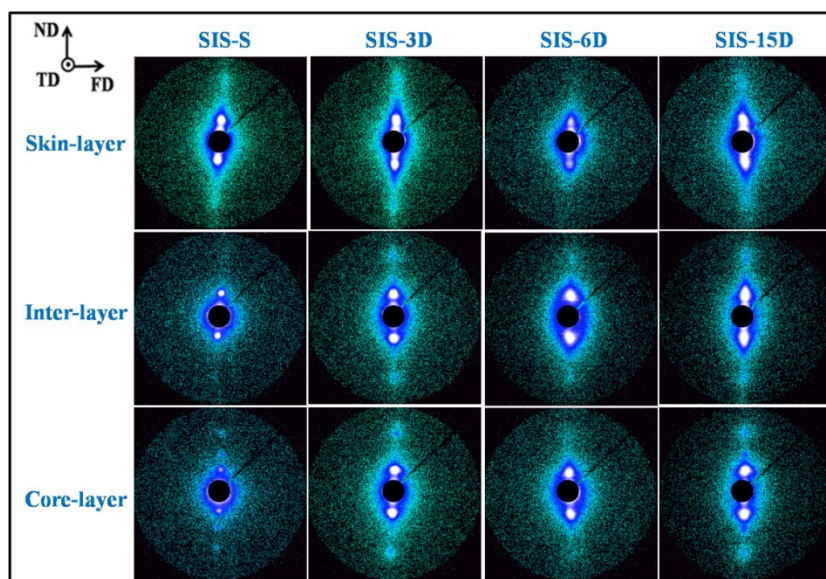


Figure S3. 2d-SAXS profiles for samples at different positions along the neutral direction (ND), transverse direction (TD) and flow direction (FD).

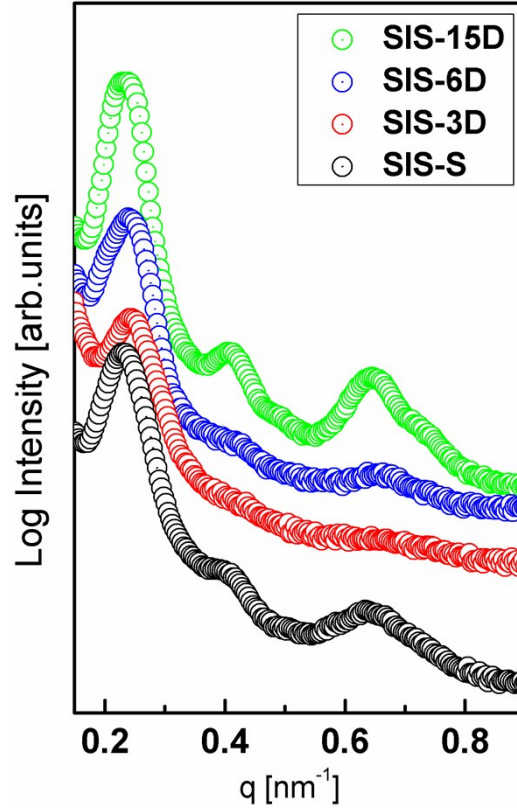


Figure S4. 1d-SAXS profiles as a function of q-spacing of different samples at the transition layer.

As shown in figure S4, 1-d scattering curves for all samples are similar and show several peaks which indicates the existence of well-ordered structure as expected. Taking q^* as the position of first peak, three distinct reflections with positional ratios of q-spacing values appear at $1:\sqrt{3}:2:\sqrt{7}$ relative to q^* in SIS-15D. This sequence of reflections generally indicates a hexagonally packed cylindrical structure emerges in SIS-15D. For detailed comparison, SIS-S shows spatial order to some extent but is lower than that of SIS-15D while dynamic packing injection molded sample with short cessation time (such as SIS-3D) owns weakened high-order reflections indicating a lack of packing order. In addition, SIS-6D gains a trend of order enhancement corresponding with $2q^*$ and $\sqrt{7}q^*$ as the shear cessation time prolongs.

In addition, the key procedure in “dynamic packing injection moulding” lies in the shear on the solid/melt interface after injection flow. The mould temperature was set as 30°C so as to instantly solidify the structures experiencing shear history. As is reported in previous literature, the fast decay of modulus emerged at temperature $T=90.7^{\circ}\text{C}$ which is close to T_g of PS. The plateau holds about 10^1 seconds. In our experiment, shear process is coupling with the cooling processing. The temperature for dynamic-packing process lies between the melt temperature (200°C) and the mould temperature (30°C). So the time scale of the relaxation of SIS is enough in our experiment (3s, 6s, 15s).