ESRF	**Experiment title:** Study of slow dynamic processes in blockcopolymers by means of x-ray photon correlation spectroscopy using coherent synchrotron radiation	**Experiment number:** SC-309
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Report:

The aim of the experiment was to measure inter-facial dynamics in an ordered lamellar blockcopolymer system with x-ray photon correlation spectroscopy.

In a layered fluidlike system wavelike excitations of the interfaces are to be expected. The corresponding disorder leads to finite correlation length in the plane of the lamellae. The diffusive dynamics connected with these fluctuations is expected to be slow. The scattering intensity reflecting the disorder in the layered structure is concentrated in the vicinity of 00l-reflections. By using an oriented sample measured in reflection geometry a strong scattering signal can be produced.

We used a PS-PI blockcopolymer with a molecular weight of 18500, and 50/50 composition. T_{odt} is 178°C. Films with a thickness of about 800nm were prepared by spin coating. With a periodicity of about 15.5 nm, this corresponds to roughly 50 layers.

Fig. 1 shows a reflectivity curve measured at 125°C, above the glass transition temperature of the PS component. The peak around $q_z = 0.04 Å^{-1}$ corresponds to 00l-reflection of the layer structure. A rocking scan taken at the peak position demonstrates the orientational order of the sample (Fig. 2). Fig. 3 and Fig. 4 show scans through the diffuse tail of the reflection taken with a 20μm slit in front of the detector, i.e. under coherent conditions. The scans in Fig. 3 are taken at 29°C ($\Delta t \approx 9$min), the scans shown in Fig. 4 at 125°C ($\Delta t \approx 3$min). The intensity fluctuations showing up under coherent conditions are caused by the speckle pattern in the scattered radiation. At the higher temperature, above the T_g of the PS component, the speckle pattern changes on the time scale of minutes indicating dynamics in the sample, whereas at room temperature changes over a few ten minutes are only minor.