

Tracing a moving thin-film reaction front with nanometer resolution

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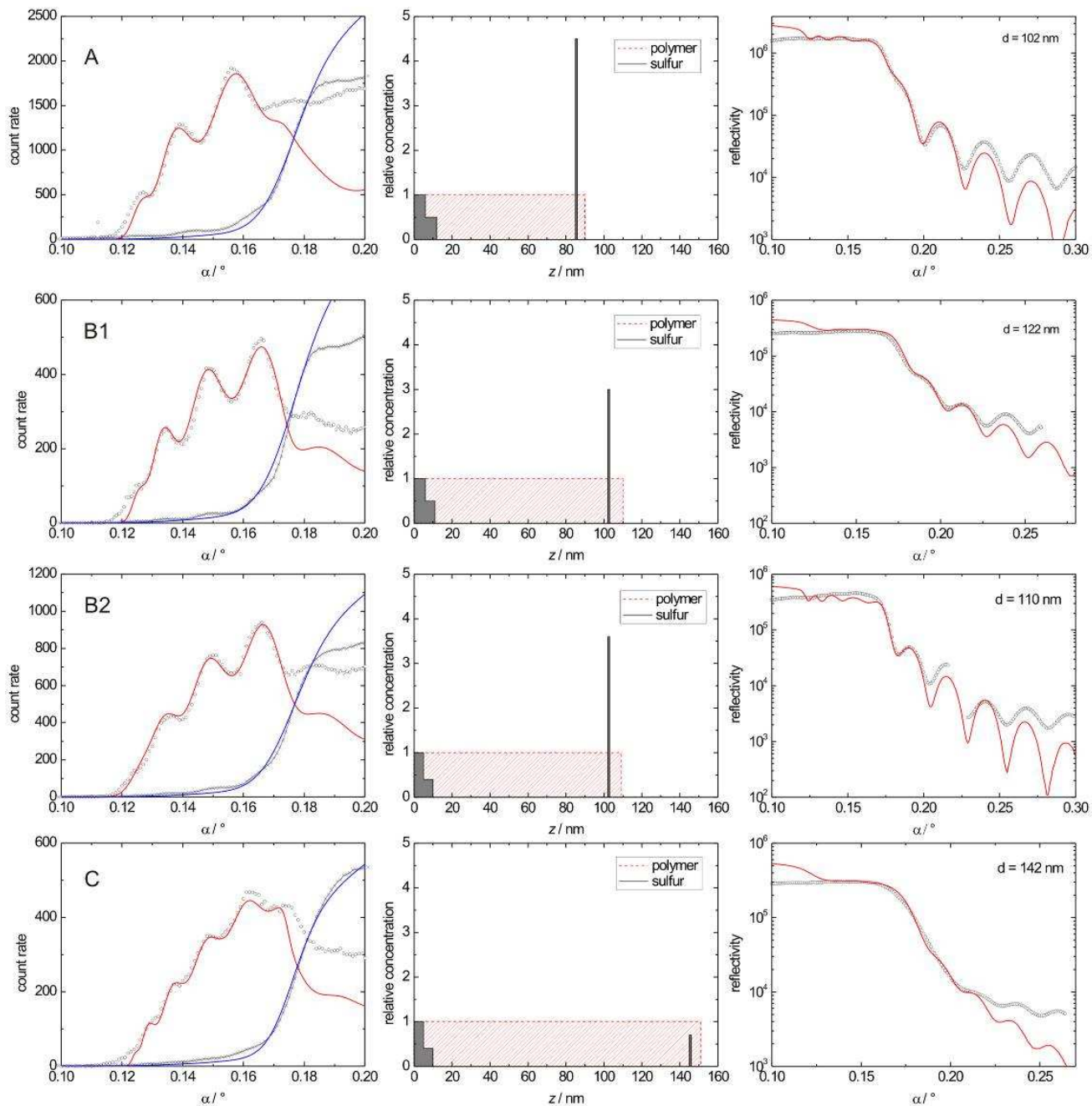


Figure SI_1. Samples A-C: Fluorescence and signals, distribution models and reflectivity curves. The crosses and blue lines indicate Si fluorescence and its simulation, respectively. The thickness of the polymer layer deduced from the scattering signal is plotted in red (shaded area). From the oscillation period of the Kiessig fringes in the reflectivity curves, the total thickness d of the polymer layers can be determined; values are given in the diagrams. The deviation of measured reflectivity data from the calculated curves are explained by a slight unevenness of the surface and a minimal bend of the substrate. Measurements were performed at 10 keV X-ray energy.

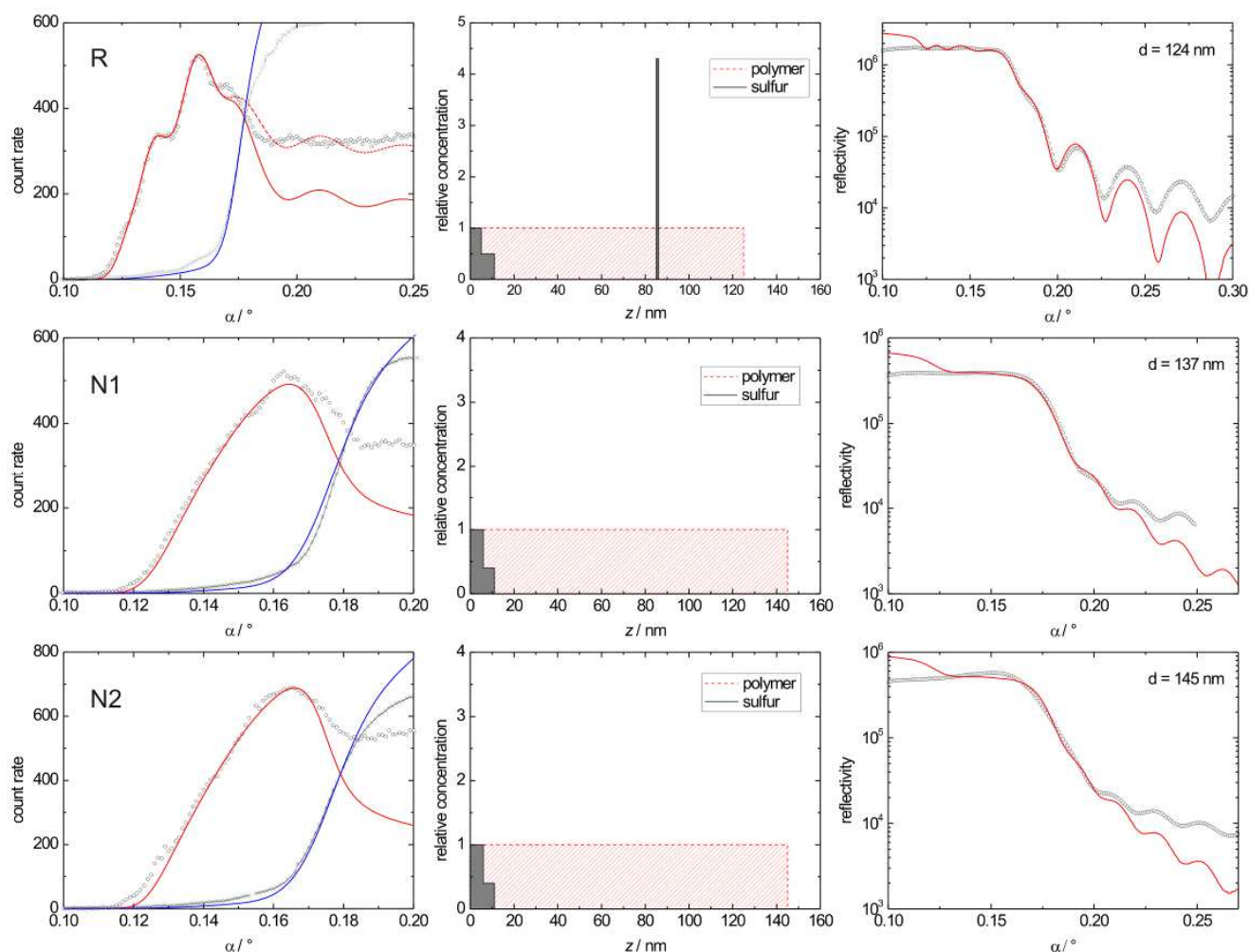


Figure SI_2. Reference samples of series 1. R: reference sample prepared with the same preparation parameters as sample C, here the not crosslinked polymer above the front was not removed. N1 and N2: Reference sample consisting of a not crosslinked layer of x-material on PEDOT:PSS. Left: Fluorescence signals of S distribution and Si substrate with simulation (S: red, Si: blue), center: distribution models of S (grey) and polymer (red line, shaded area), right: reflectivity curves with simulation (red curve).

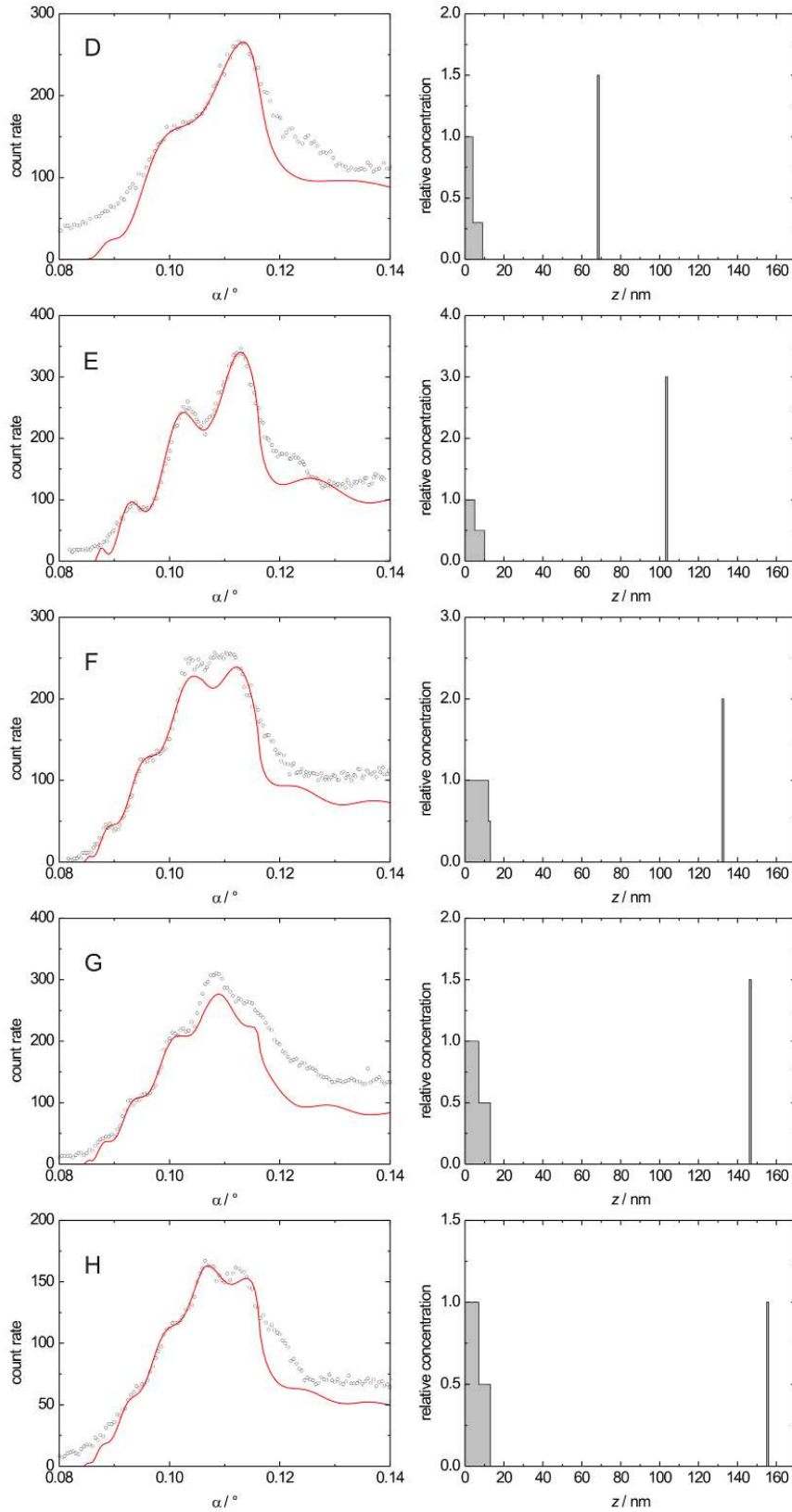


Figure SI_3. Sample series 2, analyzed with XSW fields of 15 keV. The size of the wafers of this series was only about 20% of those of series 1. The detector settings had to be optimized to the weak S fluorescence signal, so Si fluorescence could not be recorded. Due to the geometry of the samples, the scattering and reflectivity signals contain no further information about the layer thickness. Left:

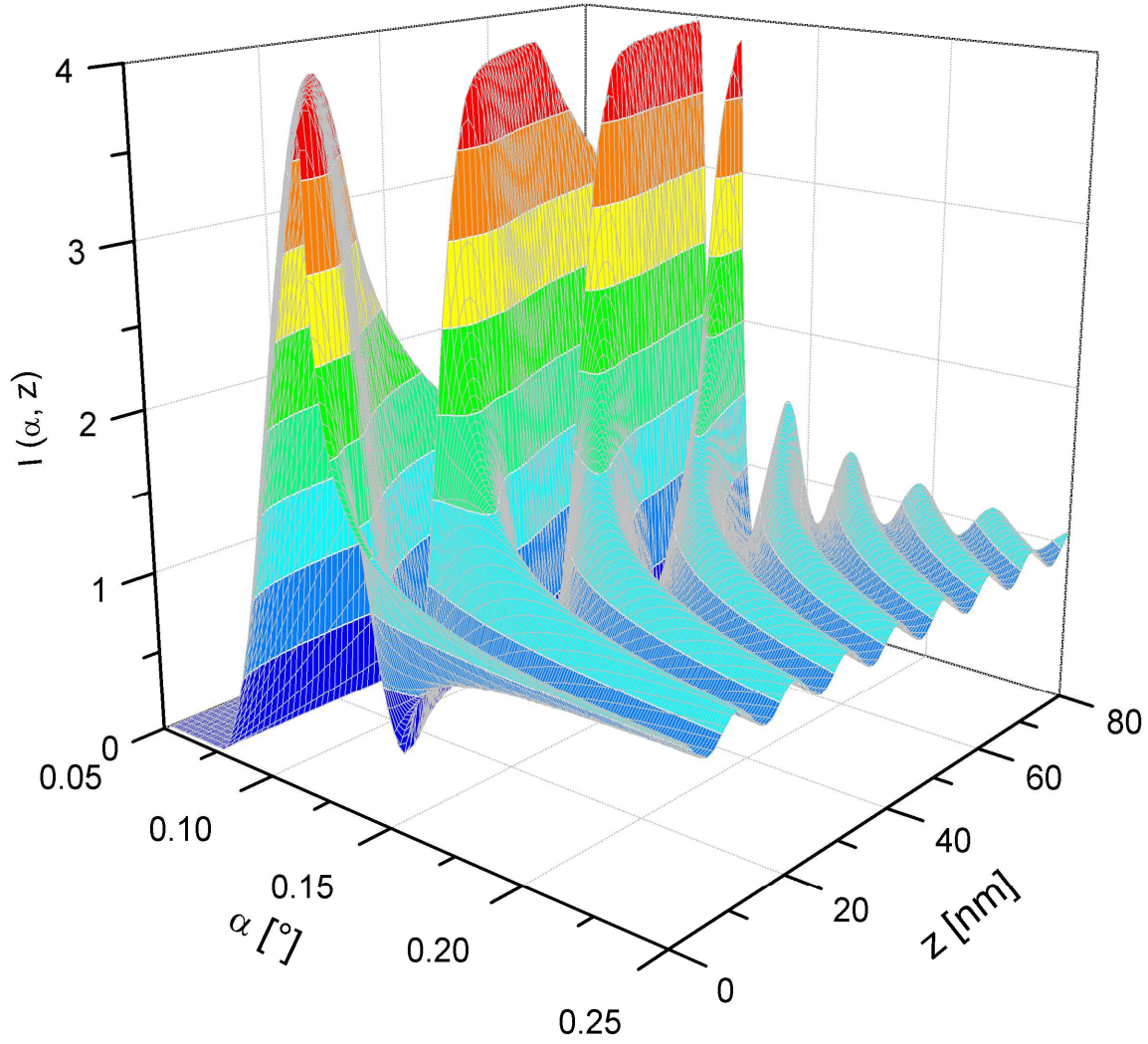


Figure SI_4. Intensity distribution $I(\alpha, z)$ of an XSW field generated by 15 keV radiation inside a polymer layer. At $\alpha = 0.085^\circ$, the beam is refracted into the polymer layer and reflected at the Si surface. The critical angle of the polymer/Si interface is found at $\alpha = 0.12^\circ$.

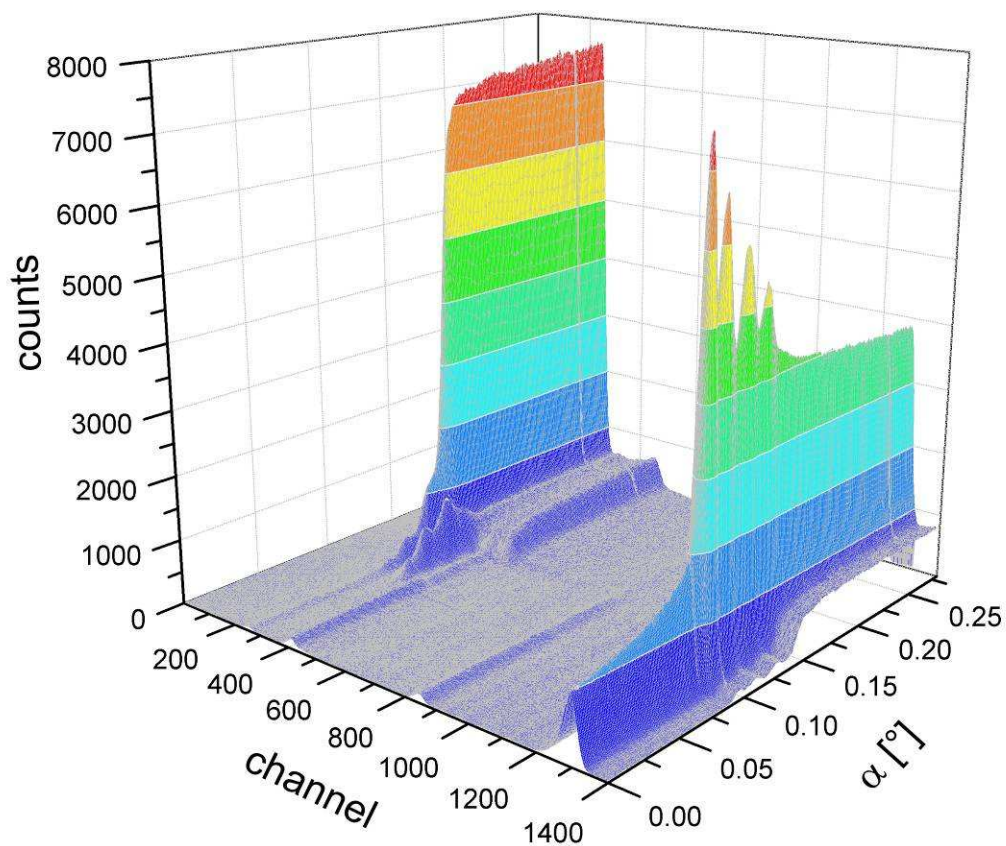


Figure SI_5. Set of fluorescence spectra recorded during the XSW scan of sample **A**. The maximum of sulfur fluorescence is recorded in channel 330, the high peaks at the lower and upper end of the spectra are Si fluorescence (channel 280) and scattering intensity (channels 1200-1350), respectively.