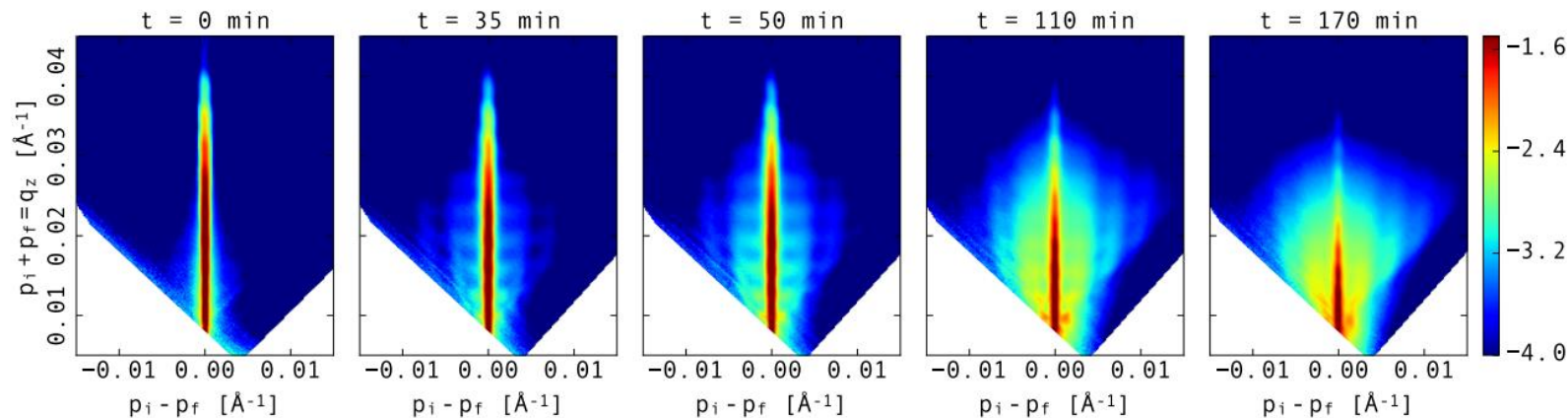
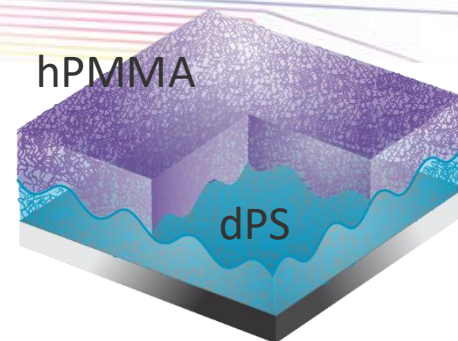


Off-Specular Reflectometry

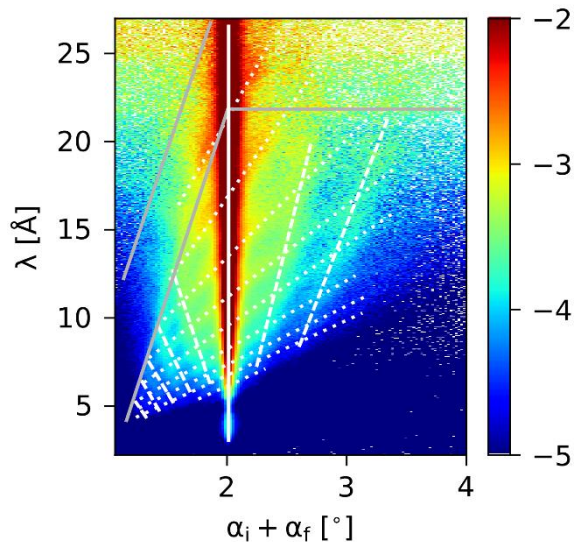
Experimental scattering patterns of a bilayer with 1500 Å top hPMMA layer on top of 150 Å dPS for $t = 0$ min, 35 min, 50 min, 110 min and 170 min



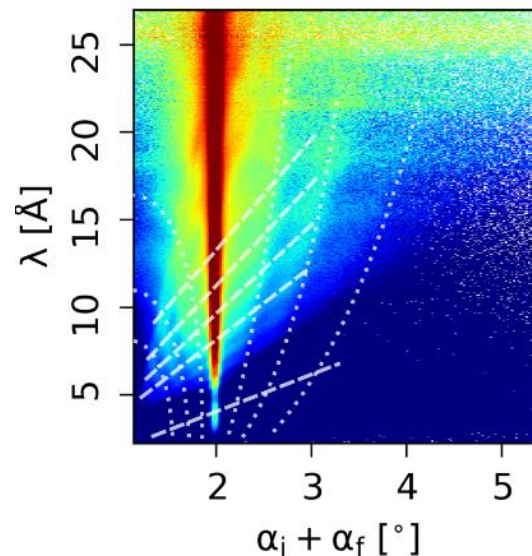
Off-Specular Reflectometry

“Raw” data on a time-of-flight neutron reflectometer: Wavelength vs scattering angle

Optics: Lines at constant $(p_i \pm p_f)$



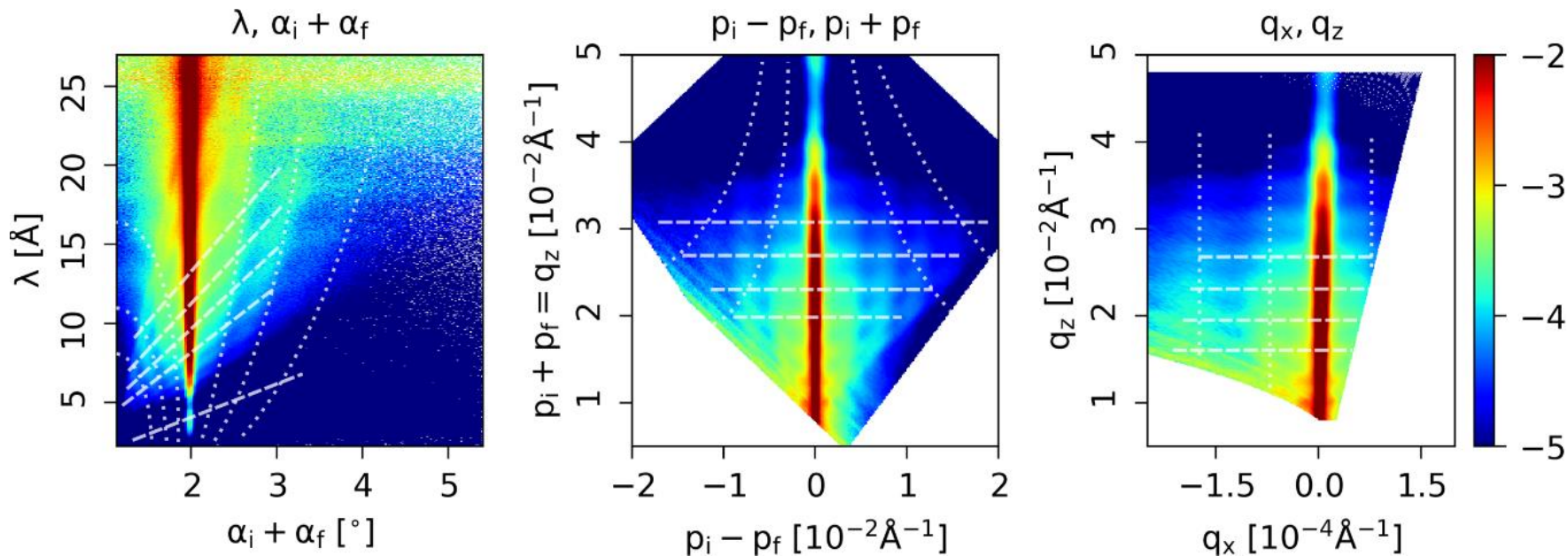
Physics: Lines at constant q_z and q_x



A. Hafner *et al.* *J. Appl. Cryst.* **54**, 924 (2021).

Off-Specular Reflectometry

Experimental scattering pattern of tri-layer Si/hPS(150nm)/dPMMA(10nm)/hPS(150nm) in different spaces:

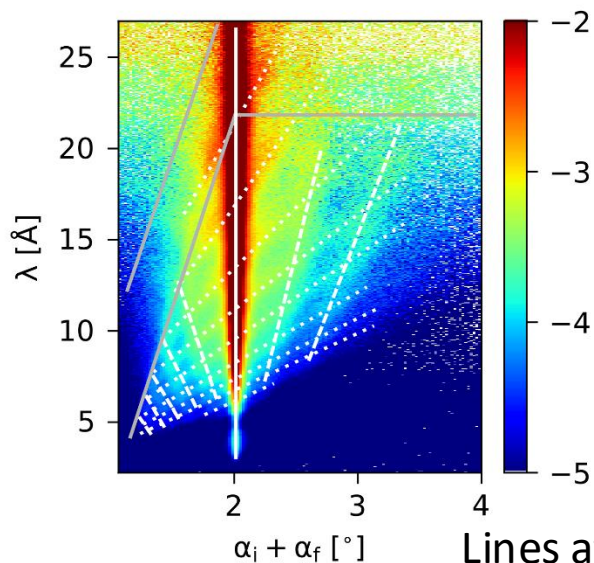
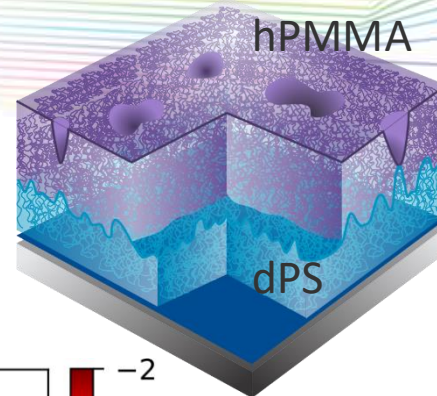


A. Hafner *et al.* *J. Appl. Cryst.* **54**, 924 (2021).

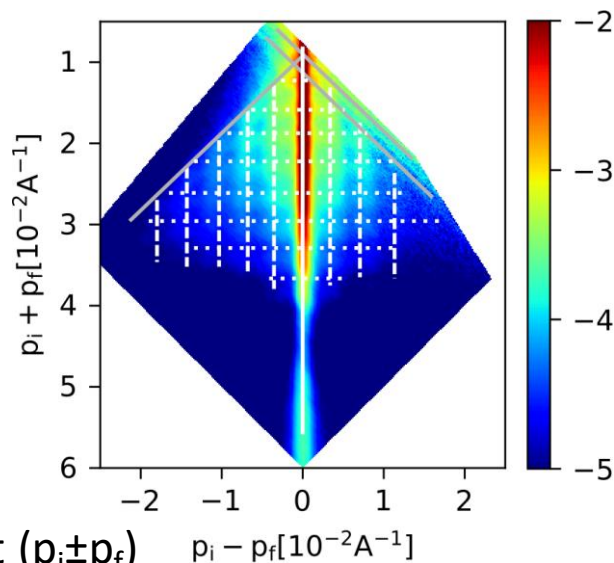
Lines at constant q_z and q_x

Off-Specular Reflectometry

Experimental scattering patterns of a bilayer with 1500 Å top hPMMA layer on top of 150 Å dPS for $t = 0$ min, 35 min, 50 min, 110 min and 170 min



Lines at constant $(p_i \pm p_f)$



A. Hafner *et al.* *J. Appl. Cryst.* **54**, 924 (2021).

Off-Specular Reflectometry

Data Reduction

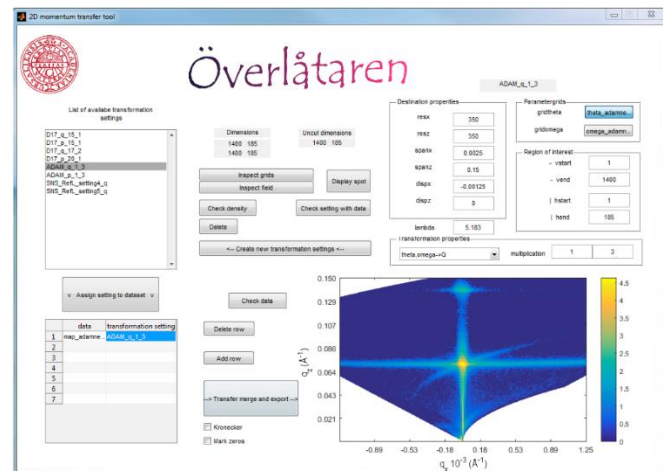
- Monochromatic and TOF data is normalized with simple in-house written macros in IDL using LAMP (D17,FIGARO) or IgorPro (S-ADAM) into angular/wavelength space and can be re-binned to q or p_i/p_f space by a user-written program “**Överlåtaren**” (stand-alone program written in MatLab)

Features:

- Normalization (direct beam(s), monitor, time)
- Re-binning to regular grid in q -space, angular space or p_i/p_f space

Outlook:

- Combining into one program (Mantid)
- Gravity correction

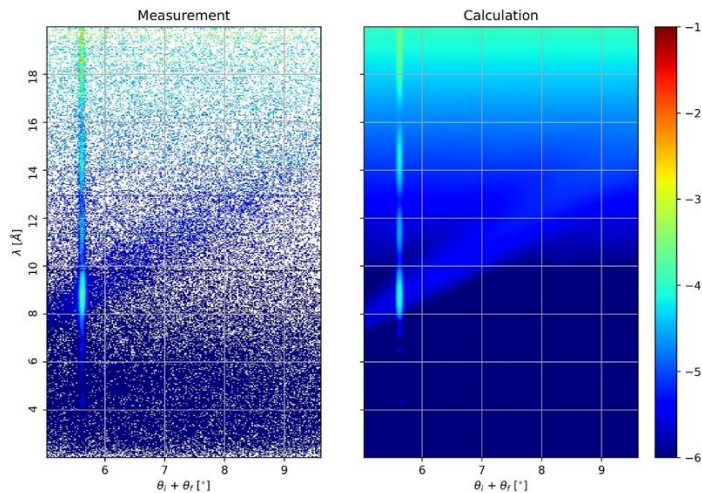
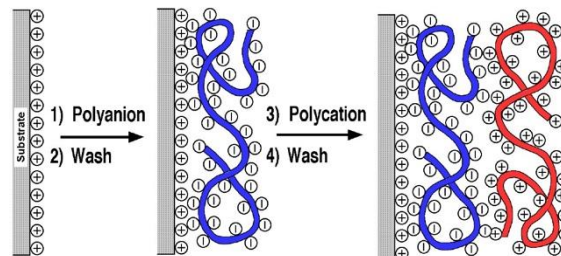


F. Adlmann *et al.* *J. Appl. Cryst.* **49**, 2091-2099 (2016).

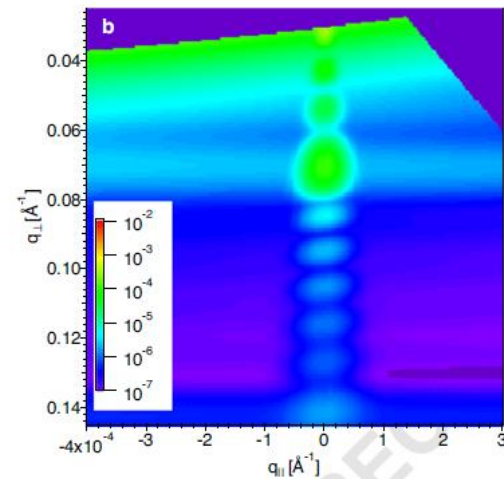
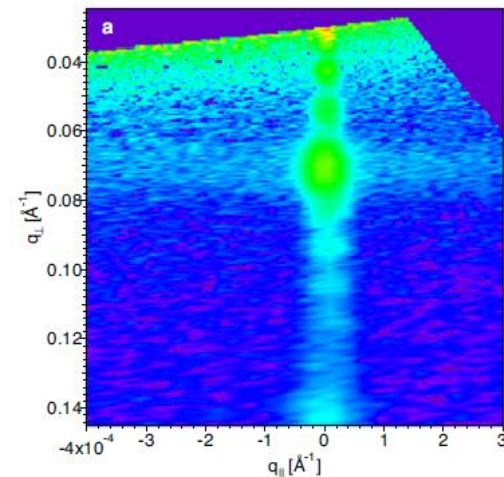
Off-Specular Reflectometry

LbL PE multilayers

Decher, G., Science (1997) 277, 1232-1237.



P. Gutfreund *et al.*, *Nat. Commun.* :



Strong OSS beyond DWBA

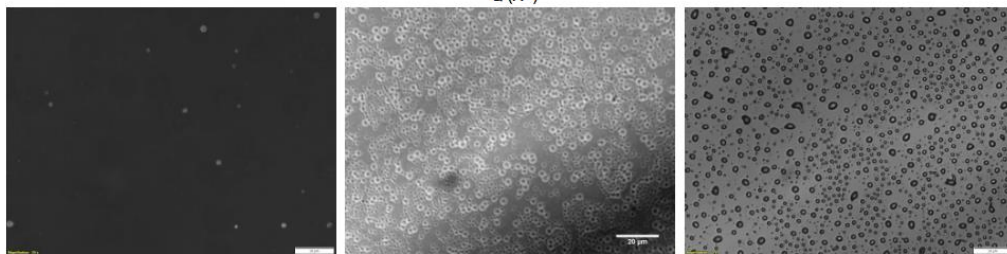
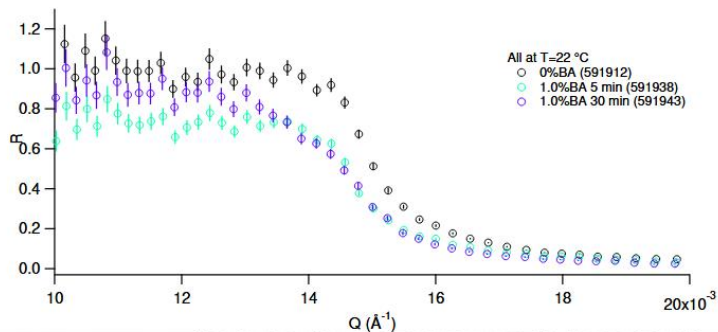
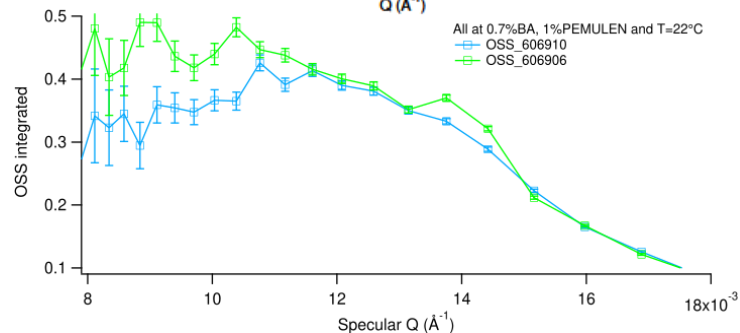
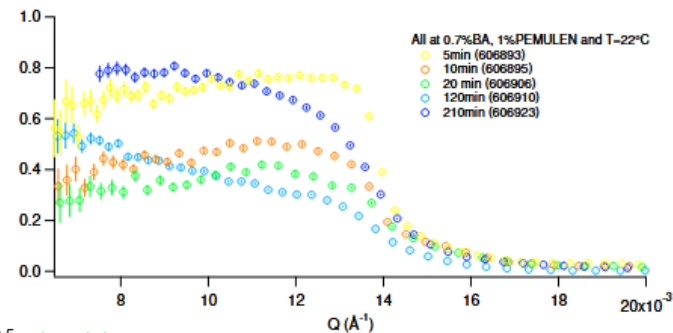


Figure S5: Top: NR curves of a Laropal®A81 polymer film in 1%BA in water mixture as a function of the time observed by NR. Bottom: Optical microscopy images (scale bar is 20 μm) of a LA film immersed for different annealing times in 0.3% BA aqueous solution. The annealing time is increasing from left to right.

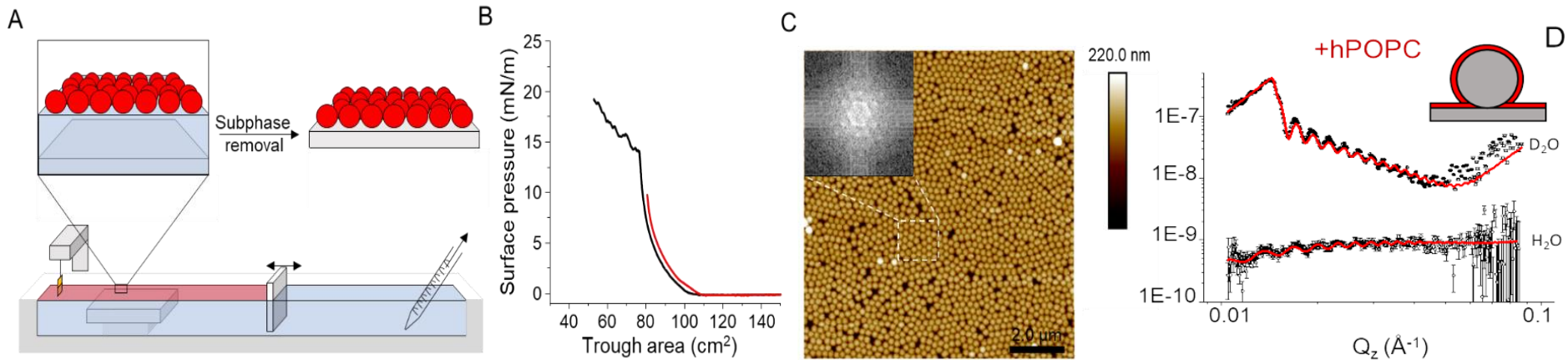
De-wetting of thin polymer film



A. Castel *et al.* *Langmuir* **36**, 12607-12619 (2020).

GISA(X,N)S

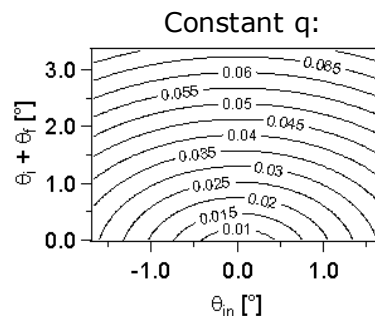
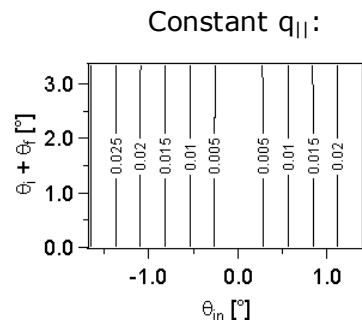
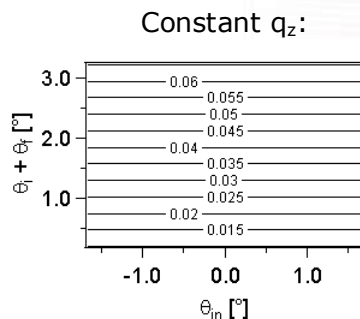
Silica nanoparticle monolayer supported on Si substrate in air



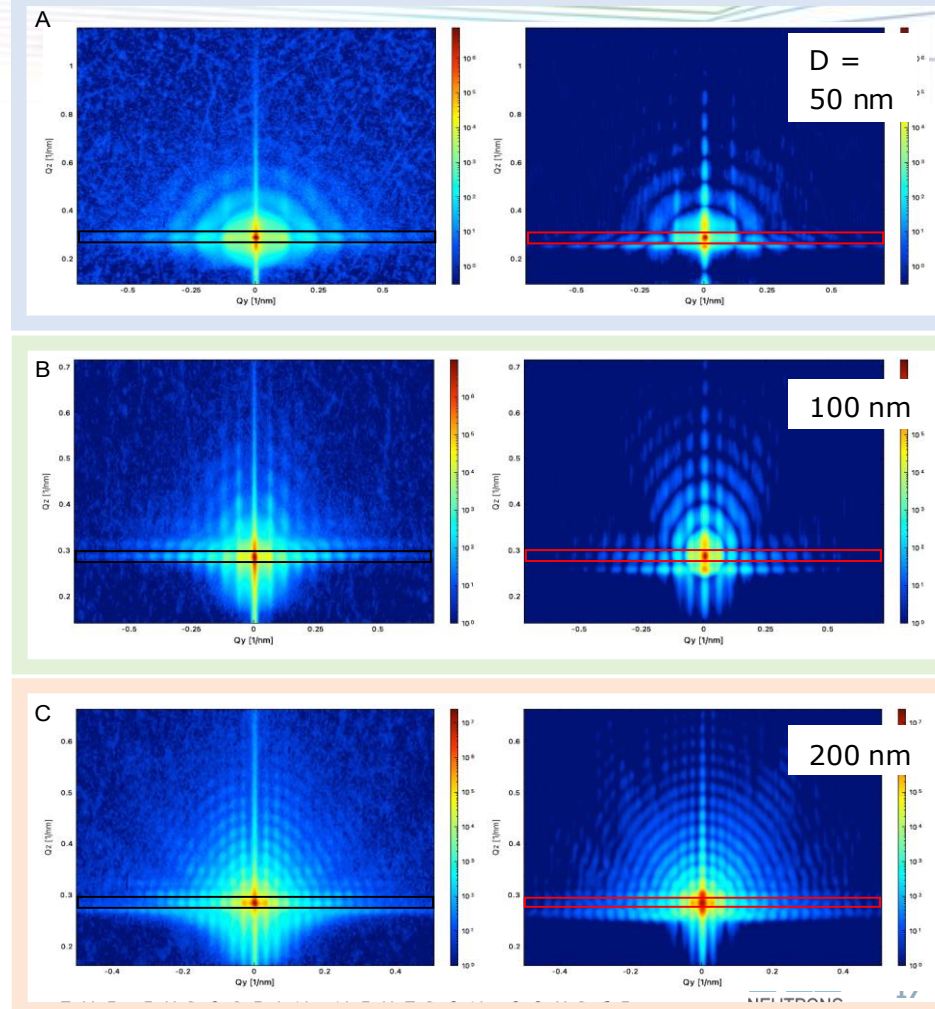
N. Paracini, P. Gutfreund *et al.* - Structural Characterization of Nanoparticle-Supported Lipid Bilayer Arrays by Grazing Incidence X-ray and Neutron Scattering, *ACS Applied Materials & Interfaces* **15** 3772-3780 (2023).

GISAXS

P. Gutfreund, G. Fragneto – Neutron and X-ray Reflectometry and Grazing Incidence Scattering, in Neutrons, X-rays, and Light, Elsevier (2025).

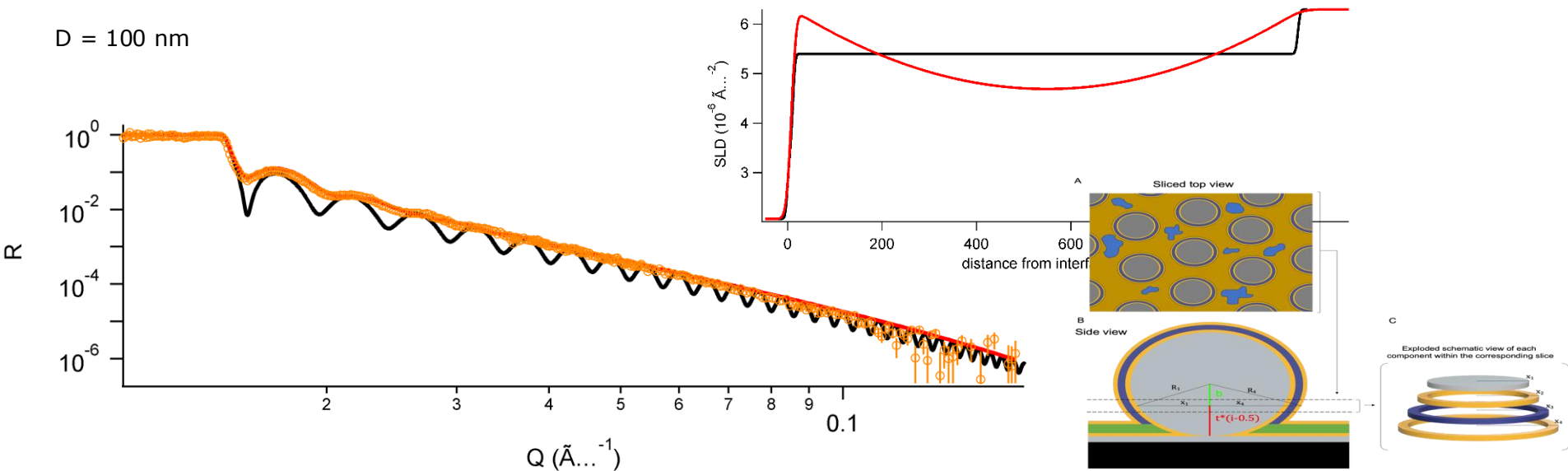


N. Paracini, P. Gutfreund *et al.* - Structural Characterization of Nanoparticle-Supported Lipid Bilayer Arrays by Grazing Incidence X-ray and Neutron Scattering, *ACS Applied Materials & Interfaces* **15** 3772-3780 (2023).



NR

Silica nanoparticle monolayer supported on Si substrate in air



N. Paracini, P. Gutfreund *et al.* - Structural Characterization of Nanoparticle-Supported Lipid Bilayer Arrays by Grazing Incidence X-ray and Neutron Scattering, *ACS Applied Materials & Interfaces* **15** 3772-3780 (2023).

Confinement (and shear) cell on D22

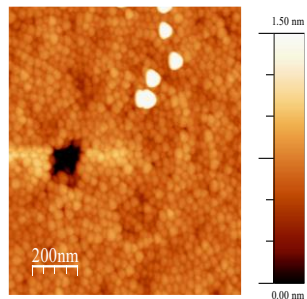
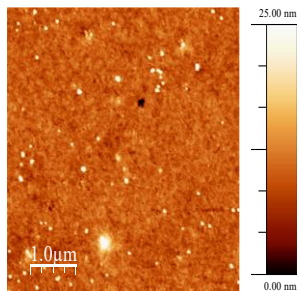
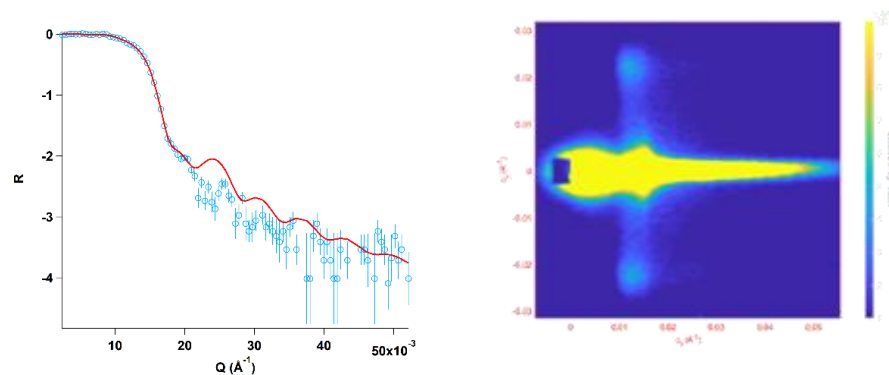
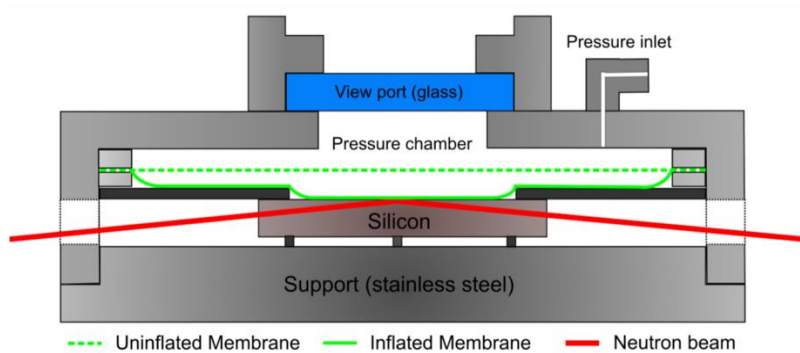


Figure 4. Topography image from the spin coated Si 100 surface (5 microns). **Figure 5.** Zoom of the Si 100 spin coated surface (1 micron).

$D = 20 \text{ nm}$

NR and GISANS on D22:



Review of Scientific Instruments, **83**, 113903 (2012)

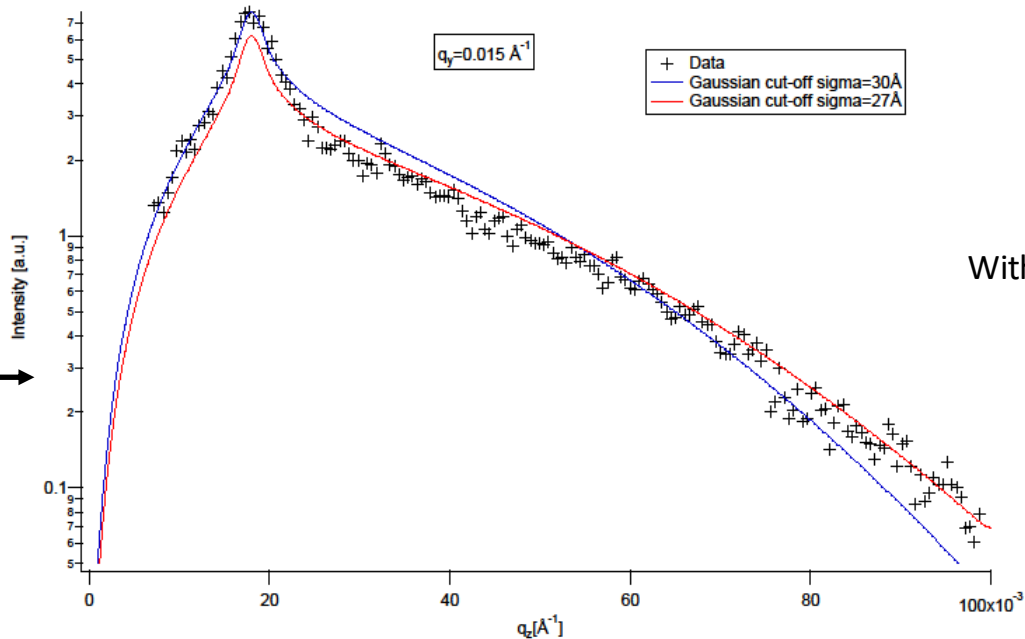
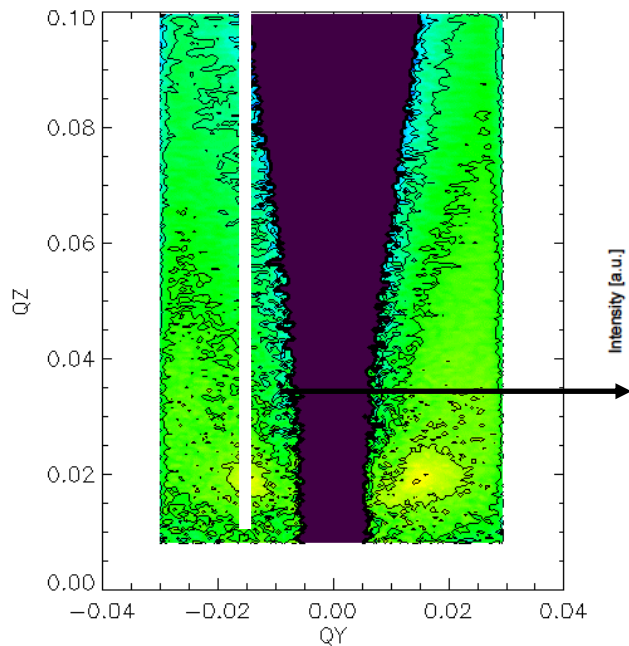
gutfreund@ill.fr

THE EUROPEAN NEUTRON SOURCE

NPs at air-water interface with ToF GISANS

GISANS on FIGARO 30 nm NPs
With C-TAB on FIGARO:

Mean in-plane distance between NPs: 41 nm
Part of NP particle in air: 10 nm



ToF - GISANS accesses much larger q_z values.