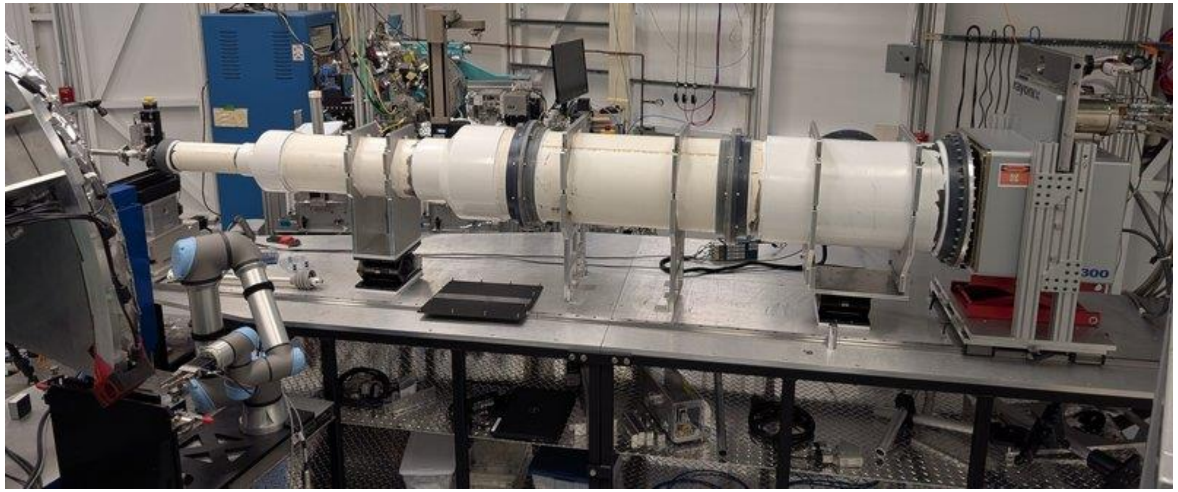
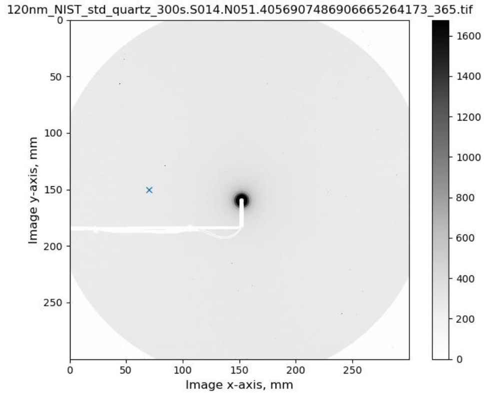
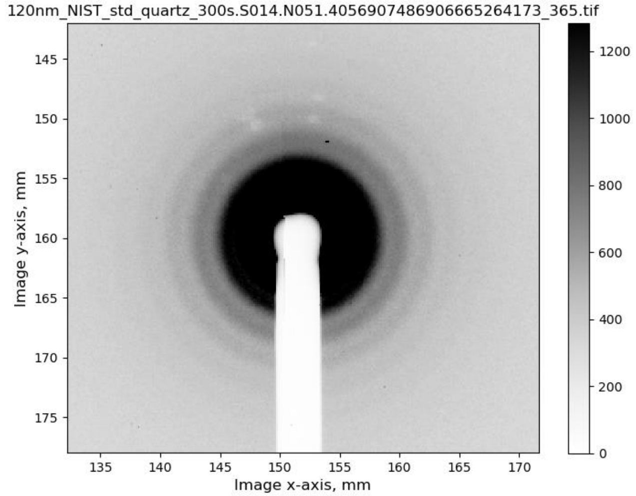
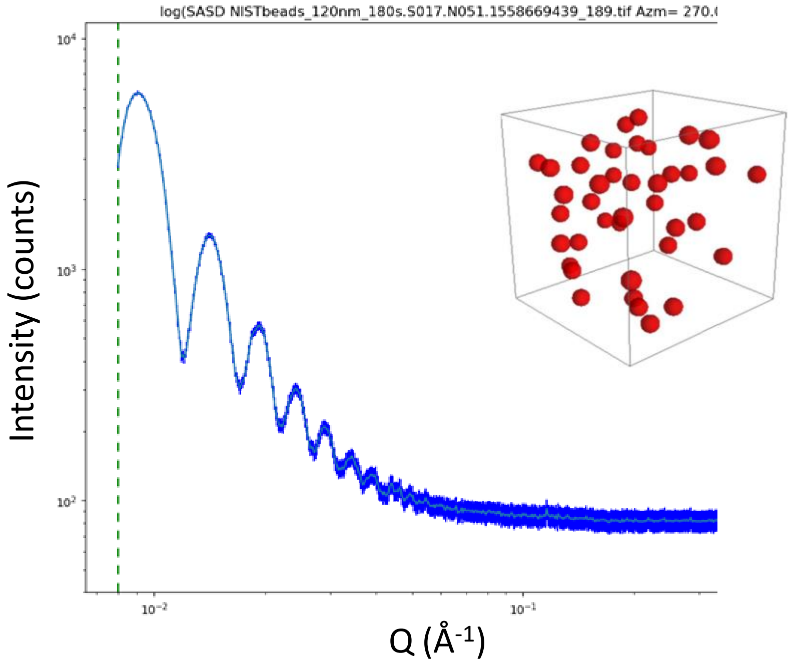
An Introduction to Small Angle X-ray Scattering (SAXS)









Adam Leontowich

CLS XRD school, Thursday, July 16, 2026

Canadian Light Source
Centre canadien de rayonnement synchrotron

The small angle X-ray scattering (SAXS) region

Instrumentation, sample prep, data collection and reduction

Basic data processing with examples from BXDS

Data processing tutorials

Brockhouse X-ray Diffraction and Scattering (BXDS) sector

JOURNAL OF SYNCHROTRON RADIATION
ISSN 1600-5775

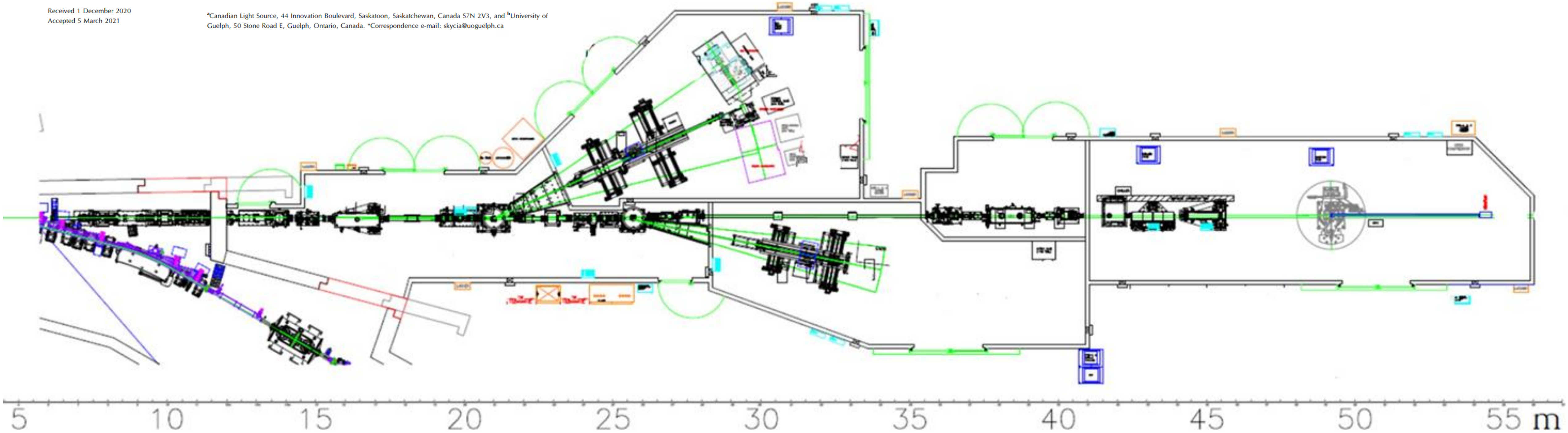
The lower energy diffraction and scattering side-bounce beamline for materials science at the Canadian Light Source

Adam F. G. Leontowich,[a] Ariel Gomez,[a] Beatriz Diaz Moreno,[a] David Muir,[a] Denis Spasyuk,[a] Graham King,[a] Joel W. Reid,[a] Chang-Yong Kim[a] and Stefan Kycia[b]*

Received 1 December 2020
Accepted 5 March 2021

[a]Canadian Light Source, 44 Innovation Boulevard, Saskatoon, Saskatchewan, Canada S7N 2V3, and [b]University of Guelph, 50 Stone Road E, Guelph, Ontario, Canada. *Correspondence e-mail: skycia@uoguelph.ca

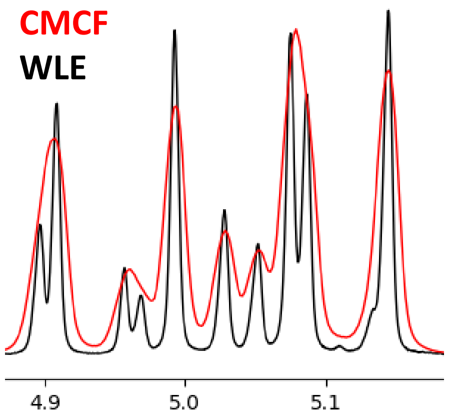
3 “hard X-ray” beamlines (5 – 100 keV)



WLE beamline

World class high-resolution powder diffraction

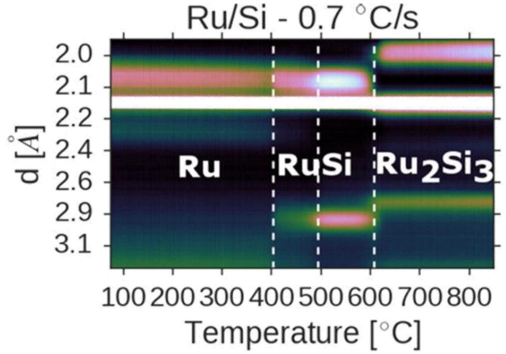
J. Reid, synthetic bone compound



- Complex structures
- Complex mixtures
- Peak shape analysis

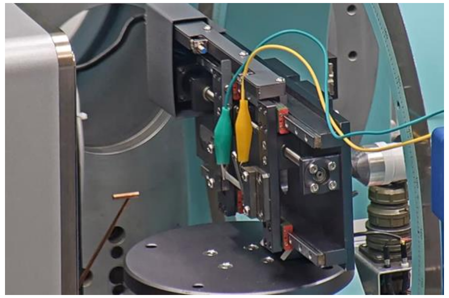
Thin film rapid thermal annealing
~1000 °C, XRD, resistivity, roughness, ultra-high purity gas

- metal films



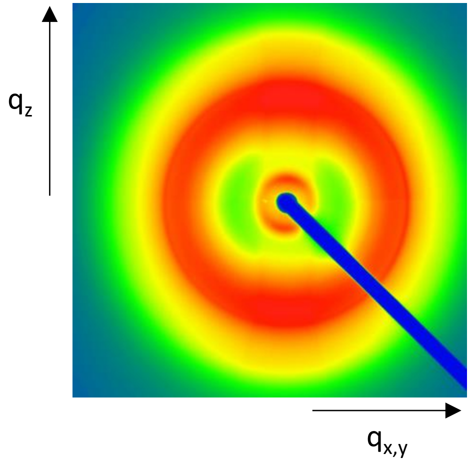
S. Dey et al., J. Vac. Sci. Technol. A 35, 03E109 (2017)

WAXS (XRD with area detector)

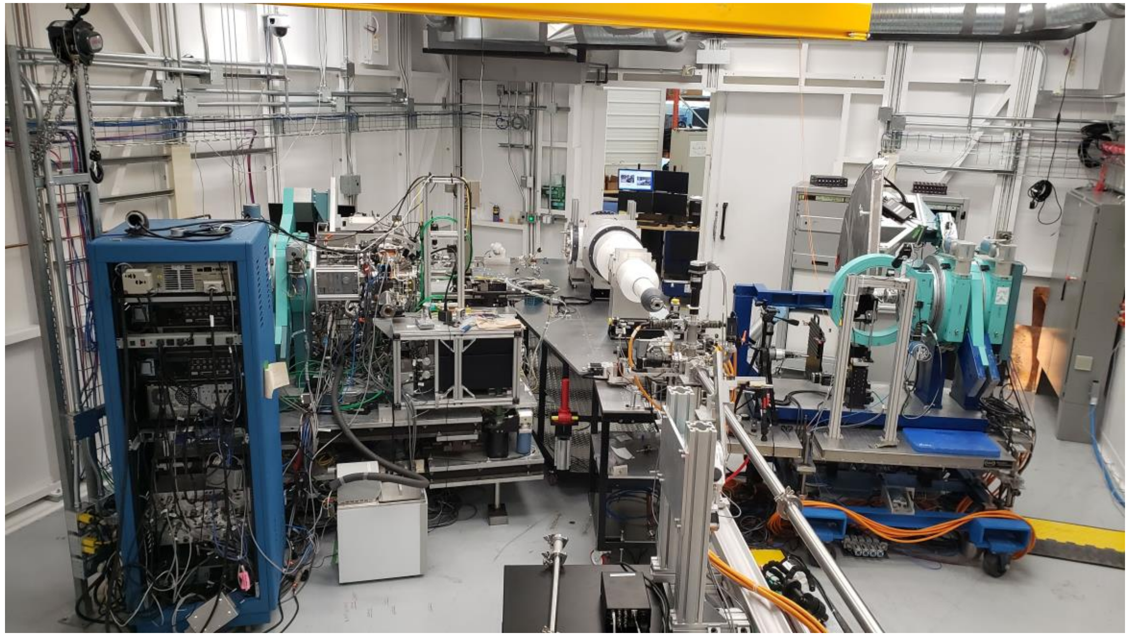


Biopolymers for bandages
Youchao Teng, Yimin Wu, U. Waterloo

Measure WAXS while stretching (0 – 100 N)



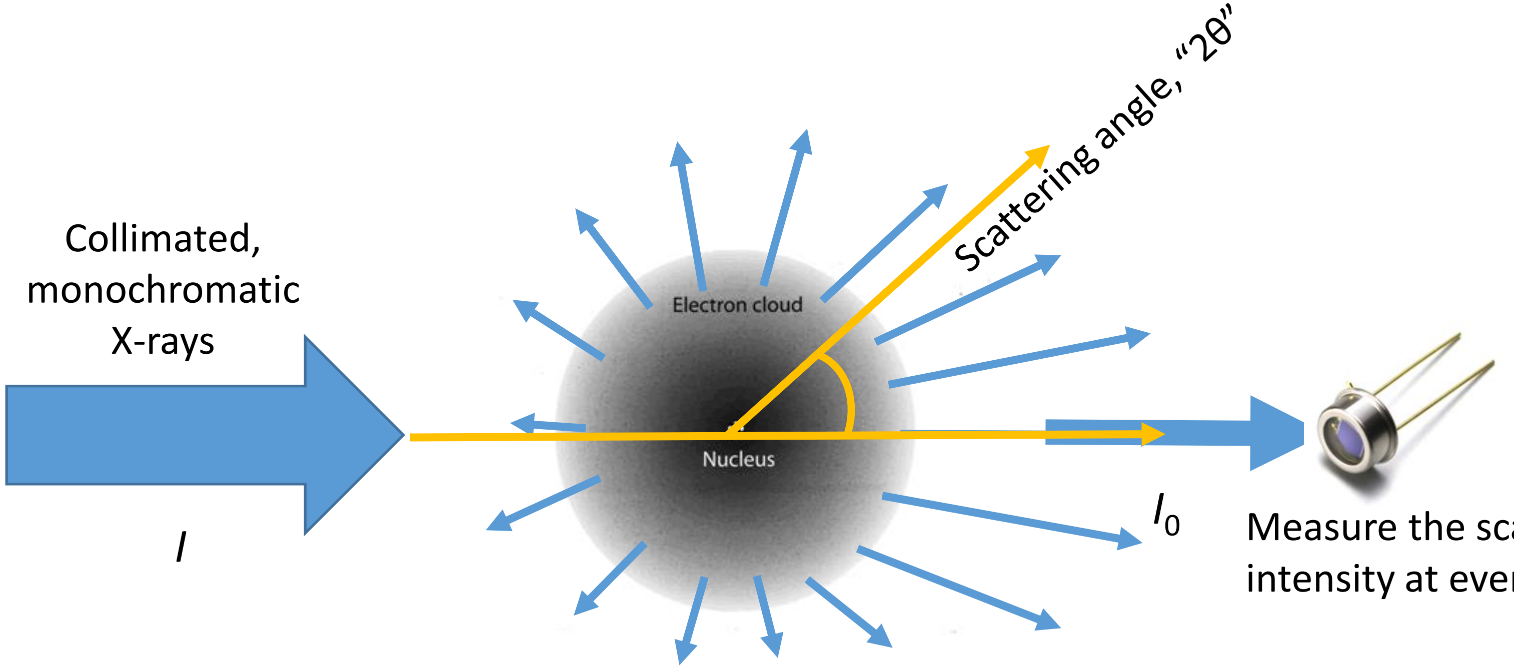
- Surfaces
- Orientation
- Speed/in-situ



SAXS

SAXS has been running since February 2021

X-ray elastic scattering



Measure the scattered intensity at every 2θ

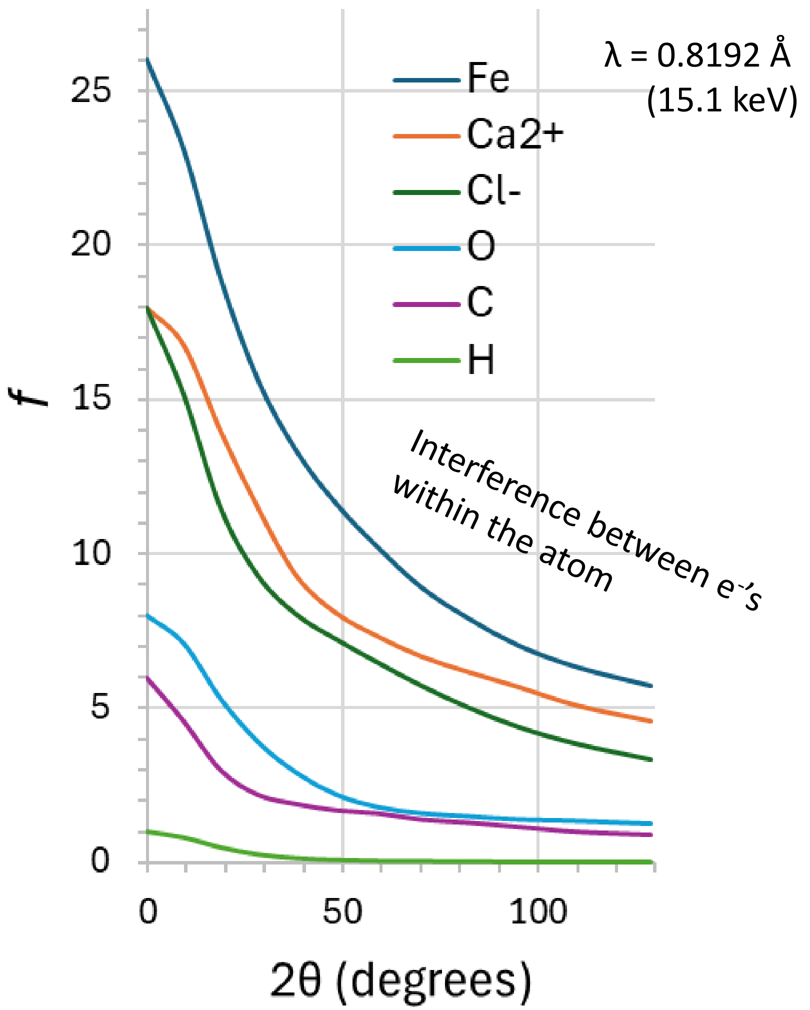
Photoabsorption

$T = I/I_0 = e^{-(\mu/\rho)\rho t}$

"Elastic" scattering

$\lambda_{out} = \lambda_{in}$

Atomic form factors
(or atomic scattering factors)



$$f = \frac{amplitude\ scattered\ by\ an\ atom}{amplitude\ scattered\ by\ a\ single\ electron}$$

From scattering to diffraction

"Bragg" diffraction

Constructive interference channels scattered intensity into specific directions

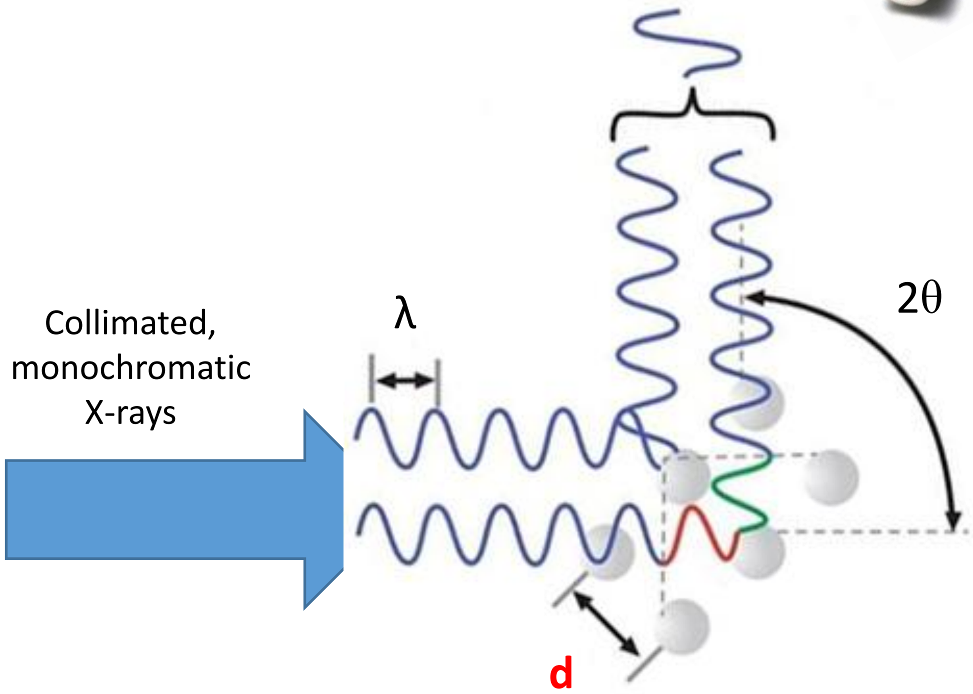
$n\lambda = 2\mathbf{d}\sin\theta$

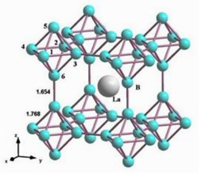
2θ

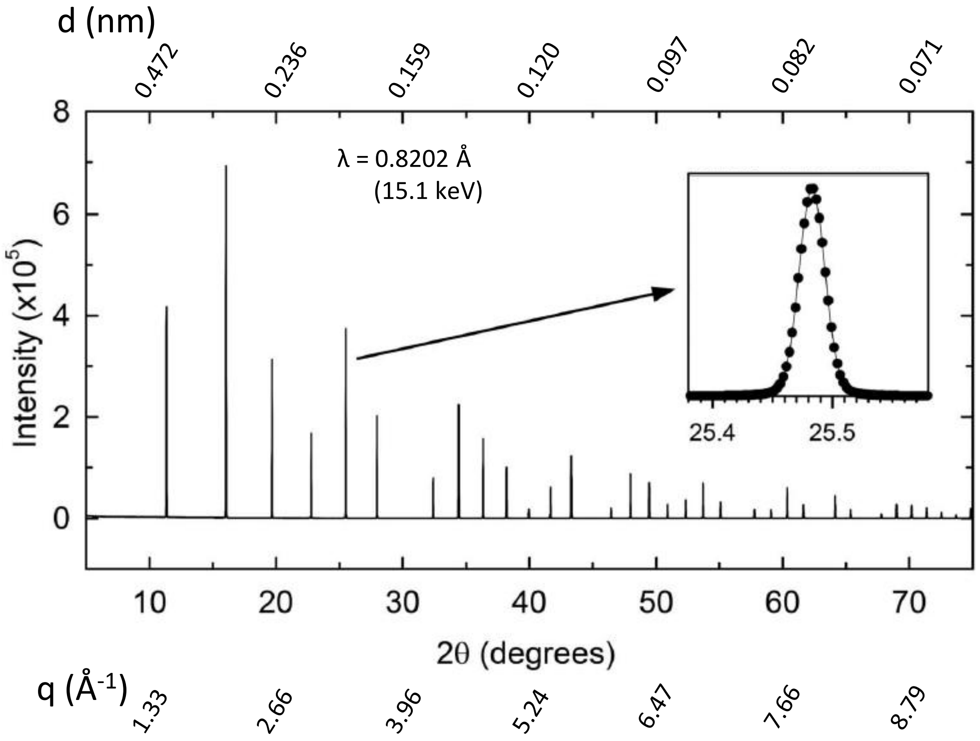
d ↔ **q**

$q = (4\pi\sin\theta)/\lambda$

$d = 2\pi/q$





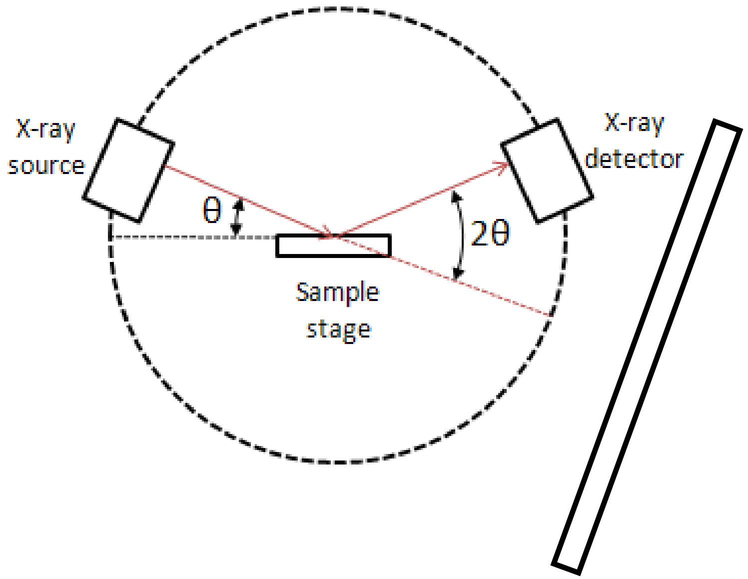


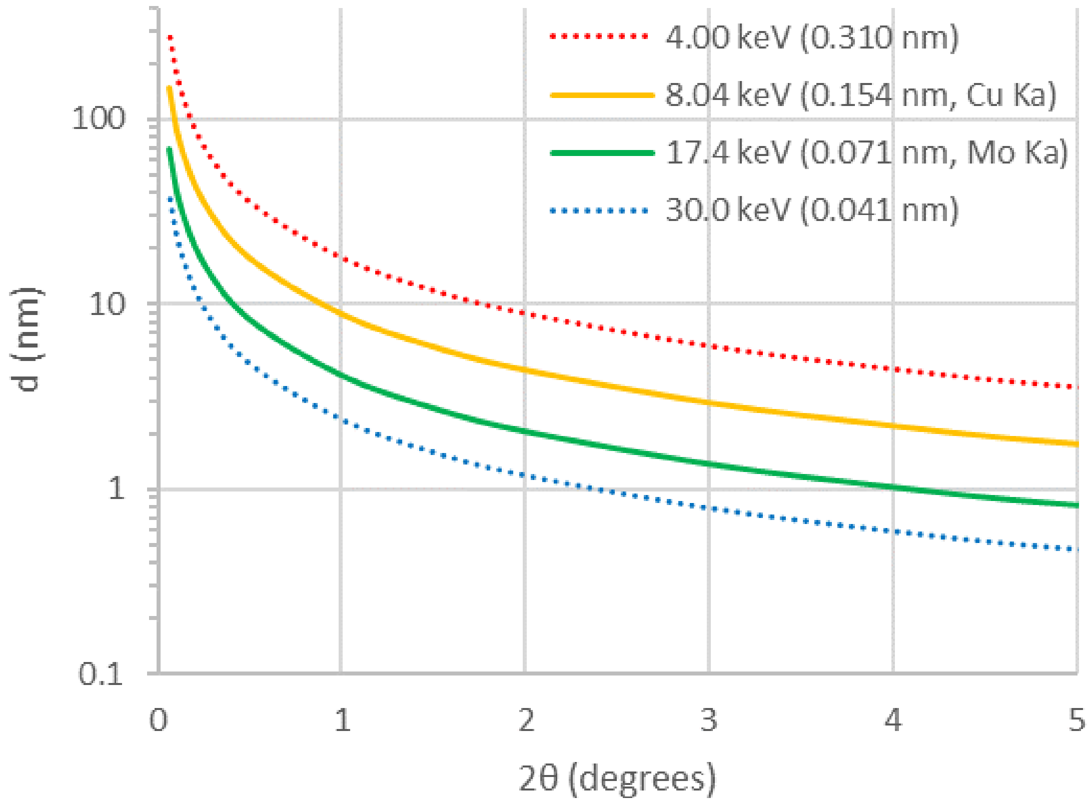
X-ray scattering and diffraction reveals structural order within materials

What is small angle X-ray scattering all about?

$\lambda = 2d\sin\theta$

Starting from powder diffraction…





The nano world

Atomic distances, spacing between planes of atoms, bond lengths

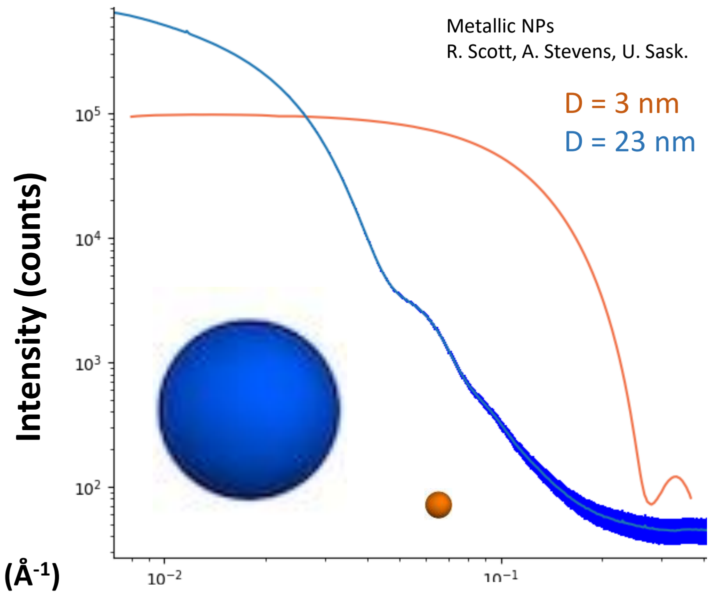
SAXS is generally 2θ = 0.05 - 5°

Probe relatively big things (1 - 150 nm) by measuring elastic X-ray scattering at small angles

Canadian Light Source Centre canadien de rayonnement synchrotron

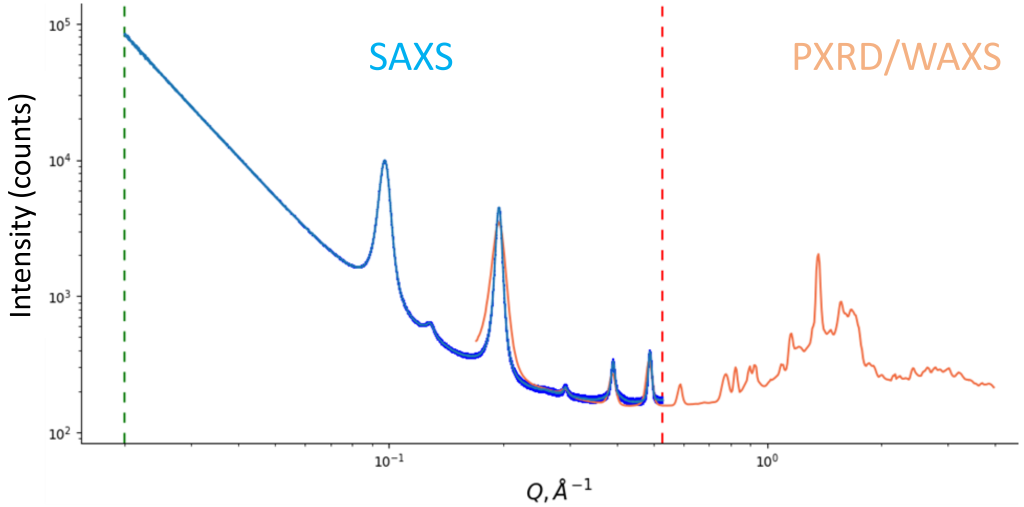
How is SAXS related to other X-ray diffraction techniques?

Typical SAXS data presentation

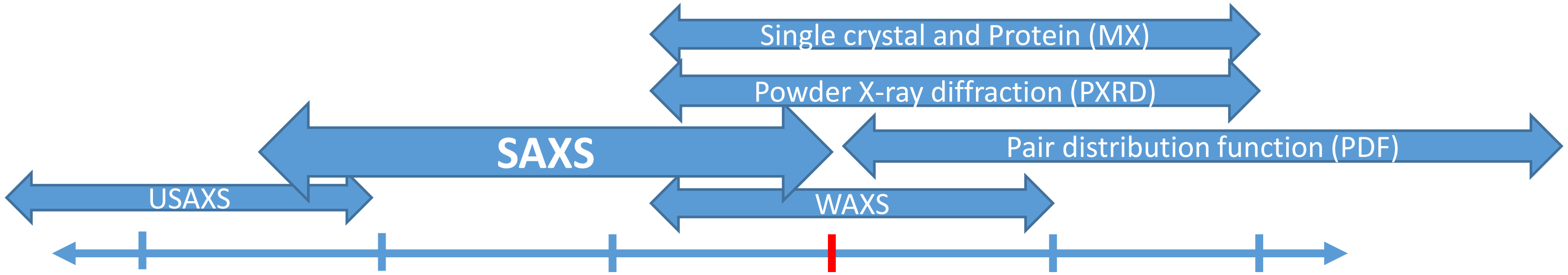


Q (Å^{-1})		
d (nm)	62.8	6.28
2θ (°)	0.108	1.08

- 1D intensity vs. Q
- log-log plot
- Proper intensity units are cm^{-1} if data are scaled to absolute intensity



Chocolate
A.G. Marangoni, U. Guelph



Q (Å^{-1})	0.00060	0.0060	0.13	0.67	5.9	9.9
d (nm)	1000	100	4.7	0.94	0.11	0.064
2θ (°)	0.0045	0.045	1.0	5.0	45	80

λ = 0.819 Å
(15.1 keV)

Nano-scale

Atomic-scale

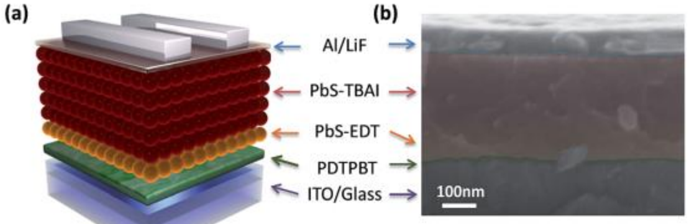
Inter-molecular distances and packing arrangements, particle size and shape

Inter-atomic distances, bond lengths, nearest neighbor atoms, Crystal structures with atomic resolution

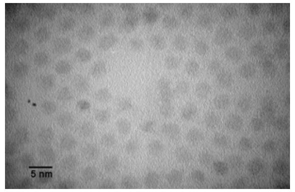
Canadian Light Source Centre canadien de rayonnement synchrotron

Applications

All kinds of nanoparticles

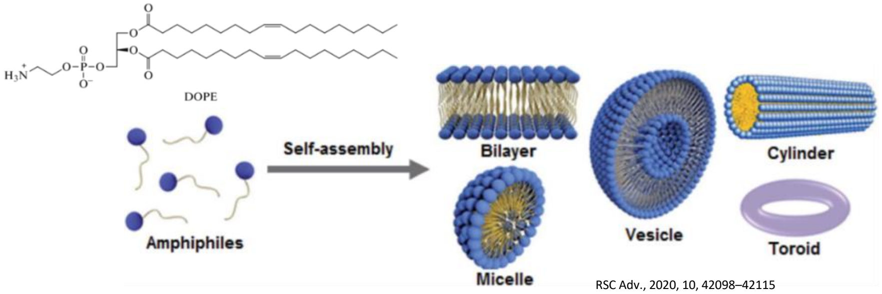


K. Lu et al., *J. Mat. Chem. A* **2017**, *5*, 23960-23966



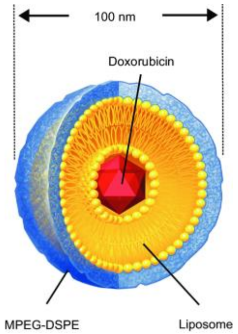
M. Yuan et al., Adv. Mater. 2014, 26, 3513–3519

Amphiphiles



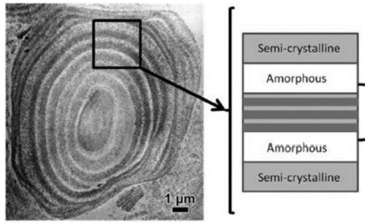
RSC Adv., 2020, 10, 42098–42115

Surfactants,
Micelles, emulsions



Drug delivery,
Pharmaceuticals

Food science

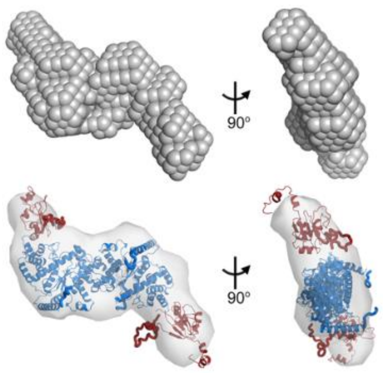


S. Perez and E. Bertoft, *Starch* **2010**, *62*, 389 - 420

Fats
Starch
Pectin

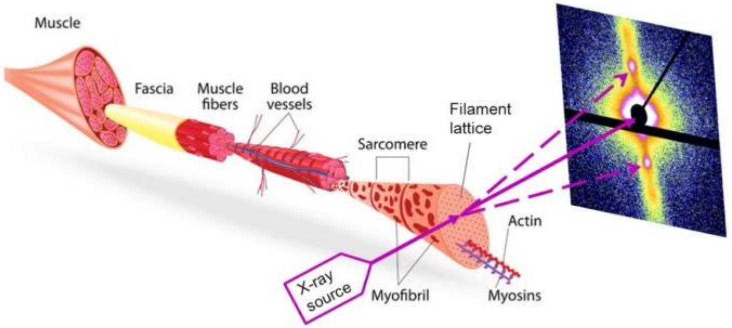
Polymers

Biomacromolecules



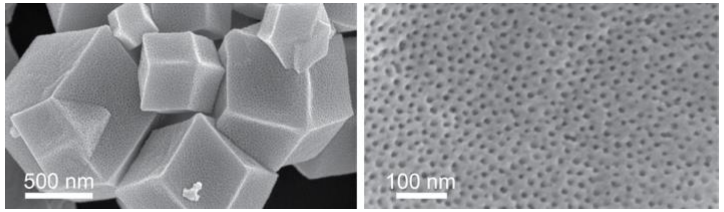
DNA
Alginate
Cellulose
Collagen
Chitosan

Proteins



https://www.techexplorist.com/scientists-investigated-pork-fillet-x-ray-light/11572/

Nano-porous materials



M. Liu, Z.M Hudson, UBC

Batteries
Biochar

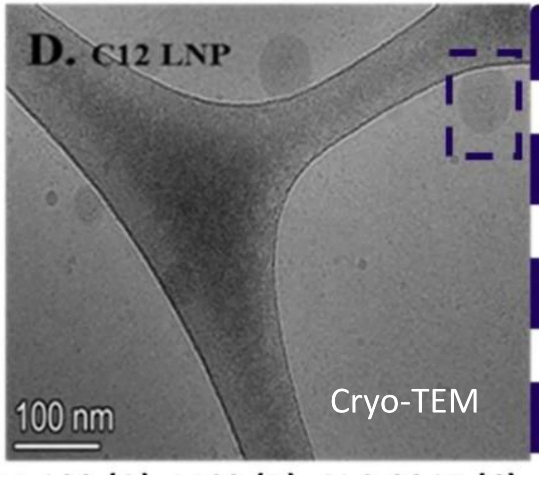
Zeolites

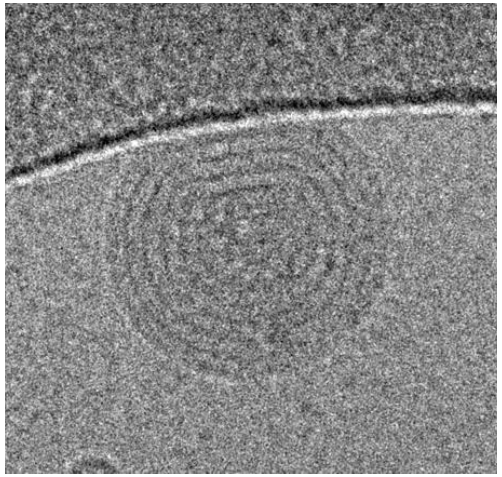
Geology

1) Packing, ordering
2) Size, size distribution
3) Shape

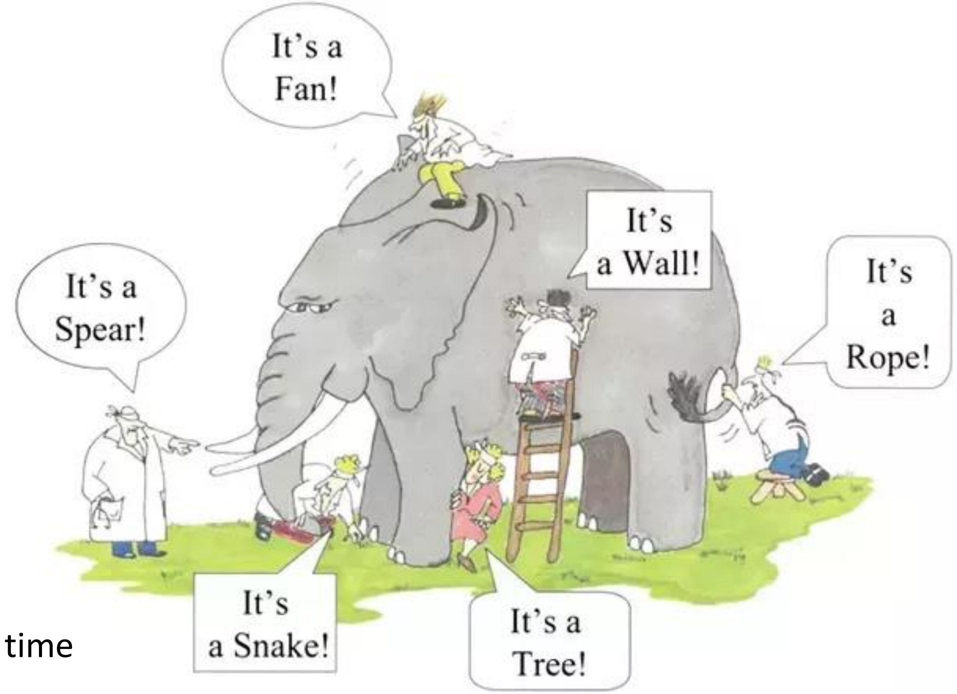
Canadian Light Source
Centre canadien de rayonnement synchrotron

SAXS is highly complementary to nanoscale microscopy





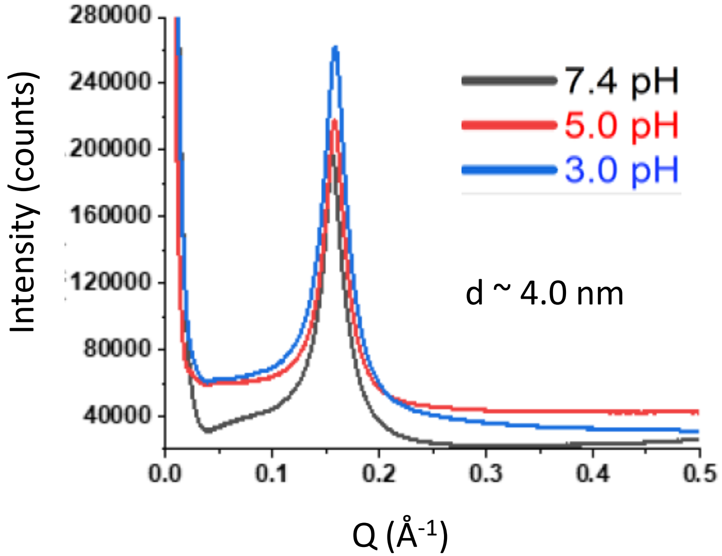
d ~ 4.0 nm



"Blind men and an elephant"

Naga Kola, Thakur Group, VIDO

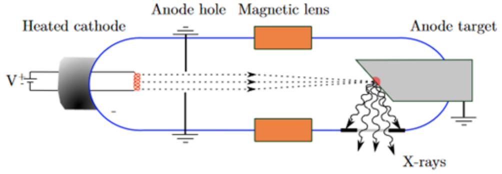
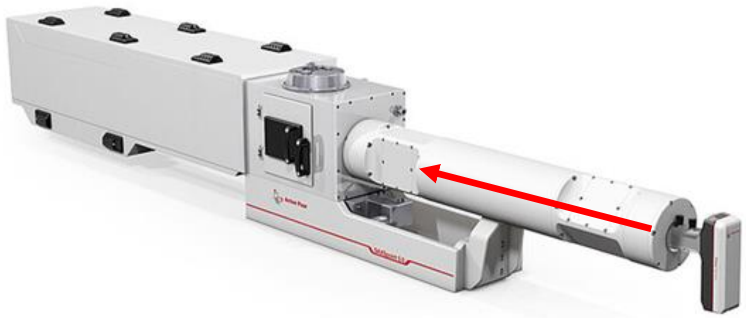
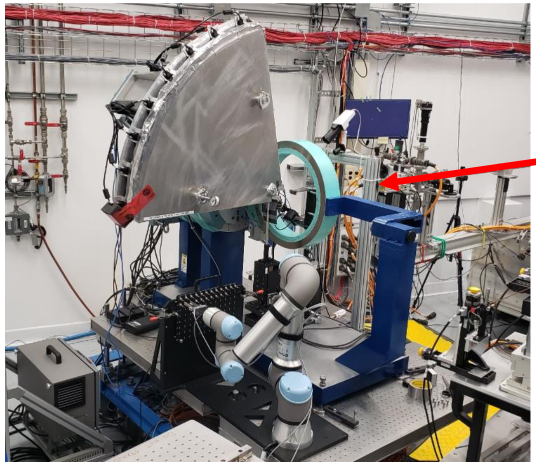
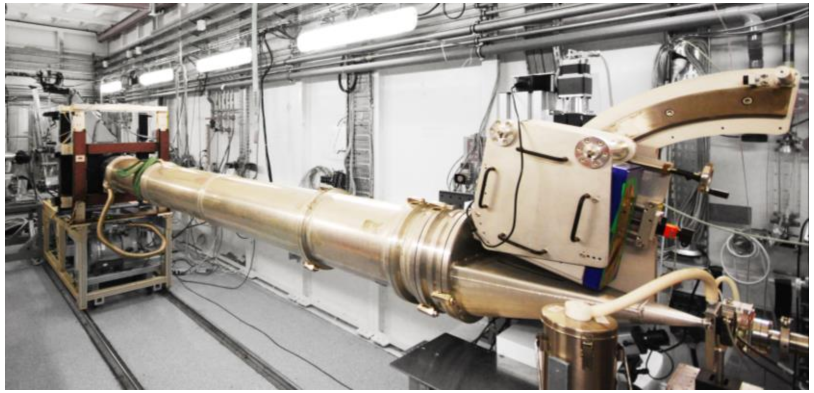
- FOV decreases as resolution increases
- Observe a small fraction of the complete sample at a time
- Challenging sample prep at smaller size



- ➢ SAXS provides nanoscale information **averaged** over the beam volume (~mm^3)
- ➢ Often complementary or extra info: surface roughness, folding/unfolding, assembled state in solution

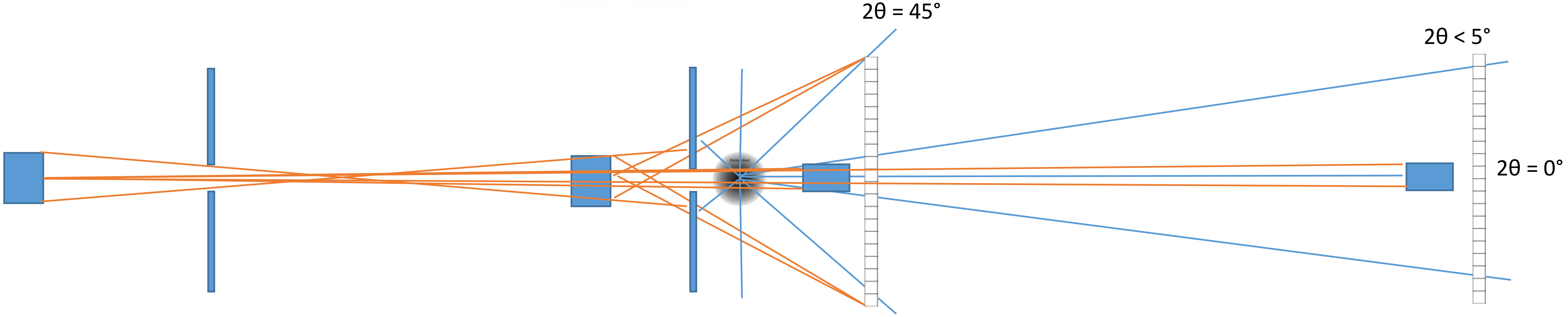
Instrumentation, sample prep, data collection and reduction

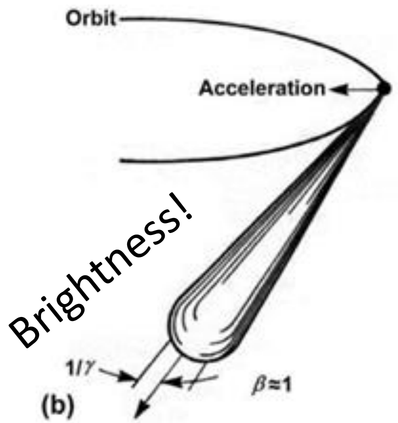
How to measure small angle X-ray scattering?

	PXRD	SAXS
Lab source 		
Synchrotron 	 X-rays	ESRF - BM26 

1) Special instrumentation required for SAXS
2) SAXS instruments are long!

SAXS instrumentation basics





- More flux (better SNR), weakly scattering objects (organics/biology)
- Better q resolution
- Time resolved, SAXS mapping
- Choice of many wavelengths

- Highly collimated hard X-ray beam (multiple slits)
- Large area detector with beamstop
- Space for >2 m sample to detector distance
- Some ability to change detector distance (SAXS/WAXS)
- Most, or ideally all, components in vacuum

SAXS user facilities in Canada

CLS

SFU

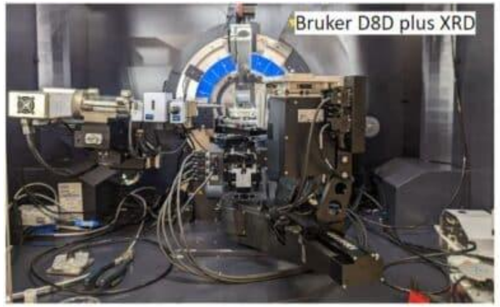
SAXSLAB, Ganesha 300XL+

https://www.4dlabs.ca/our-capabilities/equipment/small-angle-xray-scattering-system.html

UBC

Soon! Ask Anita

U. Alberta



Bruker D8D Plus XRD

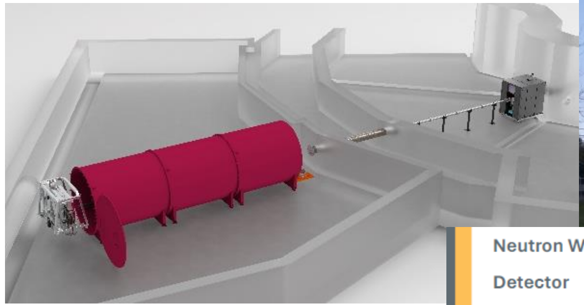
https://www.nanofab.ualberta.ca/saxs-gi-saxs-waxs-are-available-on-bruker-d8d/

U. Toronto

Anton Paar, SAXSpace

https://lab.research.sickkids.ca/sbc-facility/saxs/

McMaster



Neutron Wavelength	2.6 - 23 Å at Δλ/λ ≈ 17%
Detector	100 cm^2 at 0.9 cm
Accessible Q-range	0.005 < Q < 1.25 $Å^{-1}$
Structure Scale	0.6 – 125 nm

MacSANS – In commissioning

https://nuclear.mcmaster.ca/neutron-beams/

McGill

Anton Paar, SAXSpoint 2.0

https://www.mcgill.ca/mc2/instrumentation/x-ray-diffraction/saxs

U. Montreal

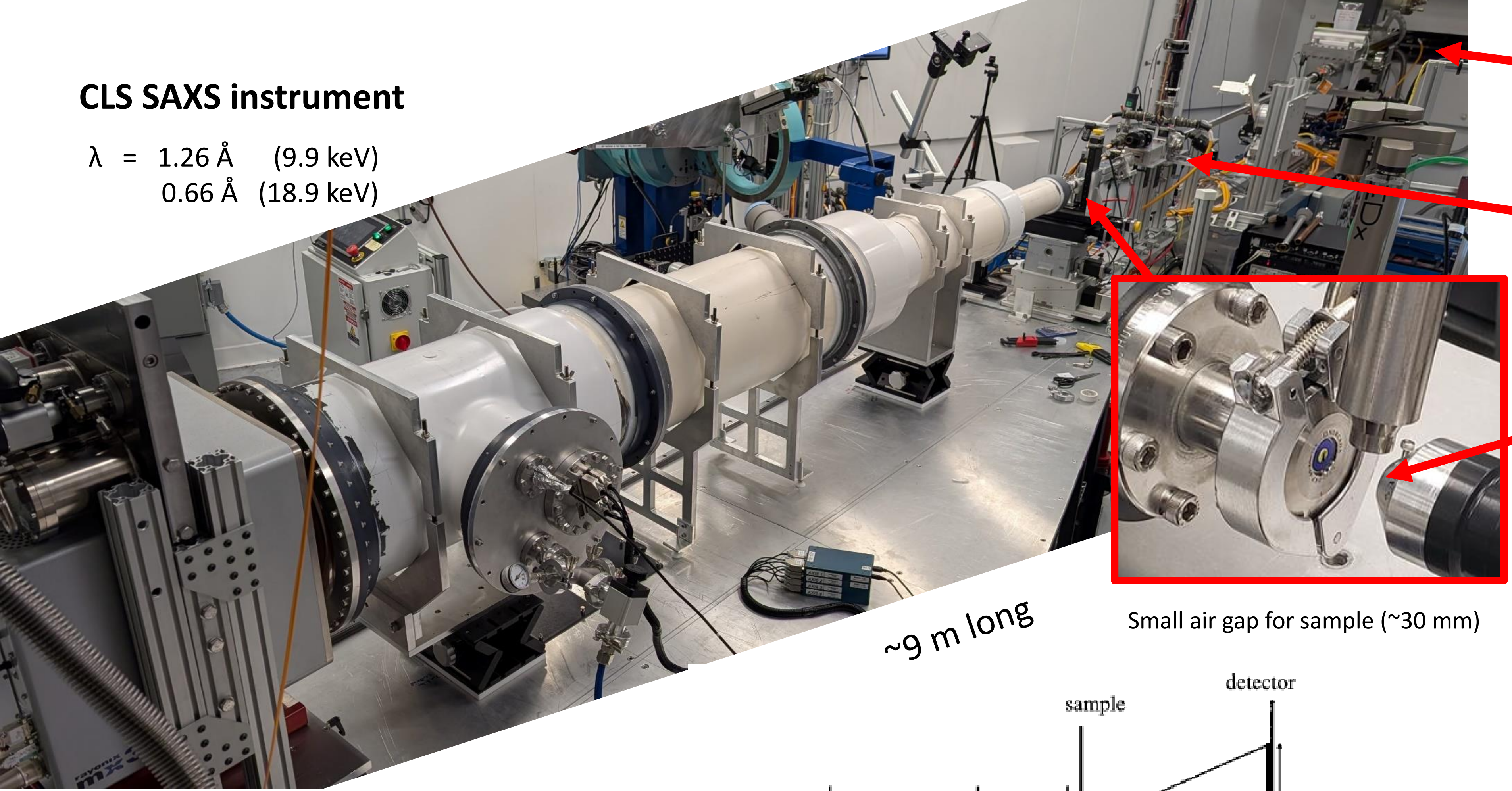
SAXSLAB, Ganesha

http://airen.bcm.umontreal.ca/biostruct/scheduling_saxs/

U. Ottawa

CLS SAXS instrument

λ = 1.26 Å (9.9 keV)
0.66 Å (18.9 keV)



1) Beam defining slit
+6.1 m
(1.00 mm x 1.00 mm)

2) Anti-scatter slit
+0.9 m
(0.25 mm V x 0.50 mm H)

3) Guard slit (0.80 mm)

Small air gap for sample (~30 mm)

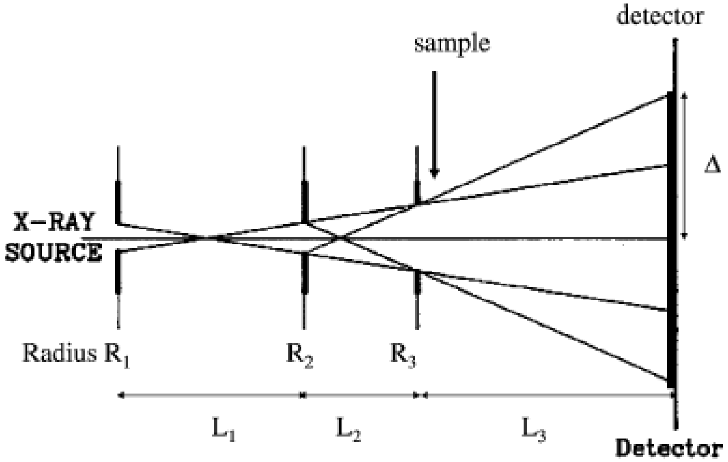
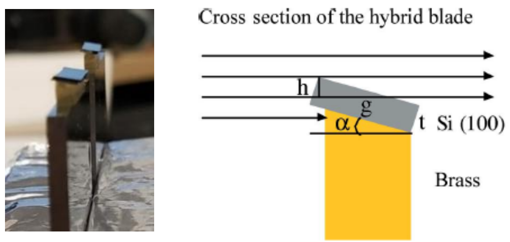


Figure 4
Schematic layout of a SAXS pinhole camera.

J. Appl. Cryst. (2004). 37, 369-380

low parasitic scatter

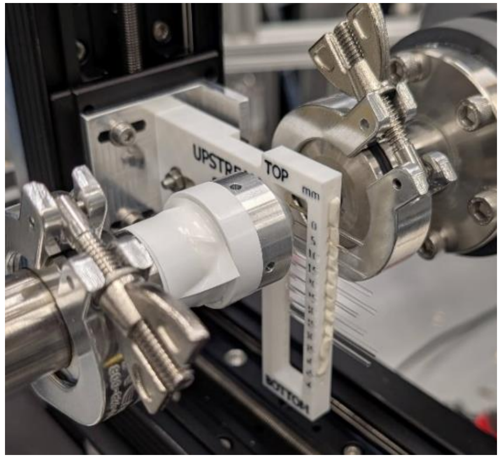


Y. Li et al., J. Appl. Cryst. (2008). 41, 1134–1139
N.M. Kirby et al., J. Appl. Cryst. 46, 1670–1680 (2013)

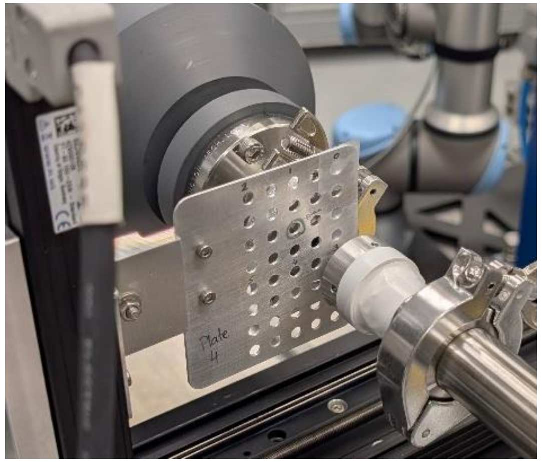
Sample preparation and mounting

Transmission

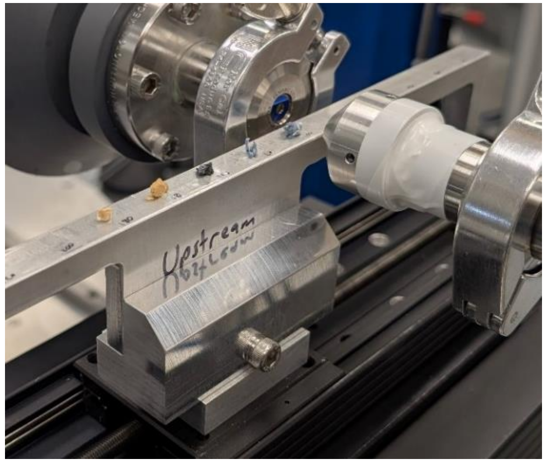
capillaries



between tape

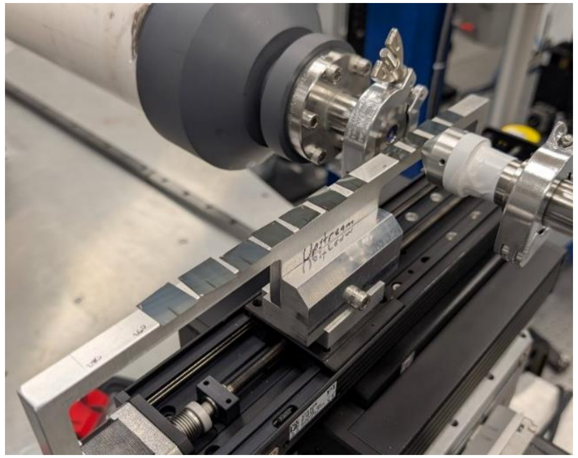


freestanding



Grazing incidence

Thin *flat* films on Si wafers, or glass slides



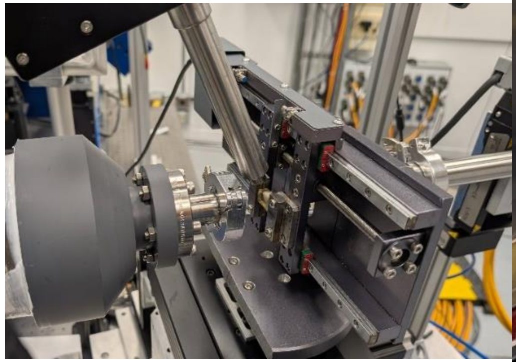
θ=0.01°

Automated measurement of ~10 samples in 30 to 60 minutes

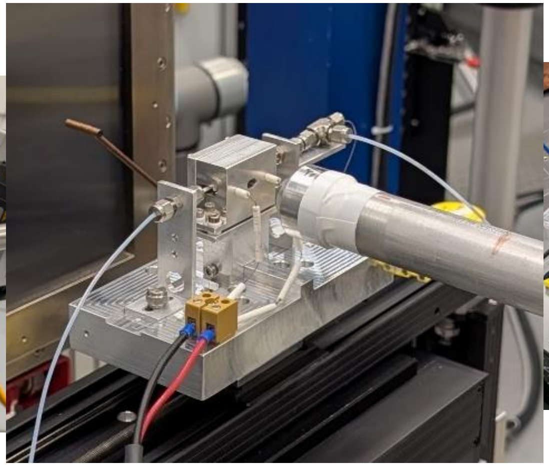
In-situ sample environments

Oxford cryostream (-193 – +226°C)

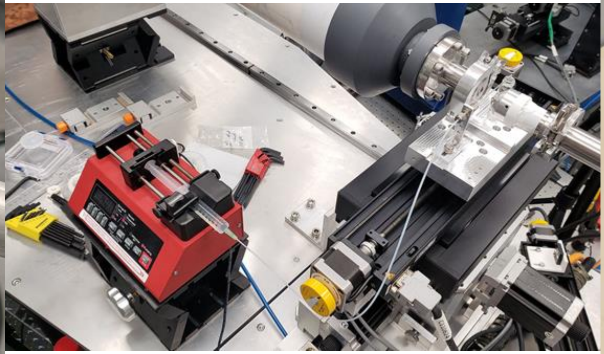
Stretching



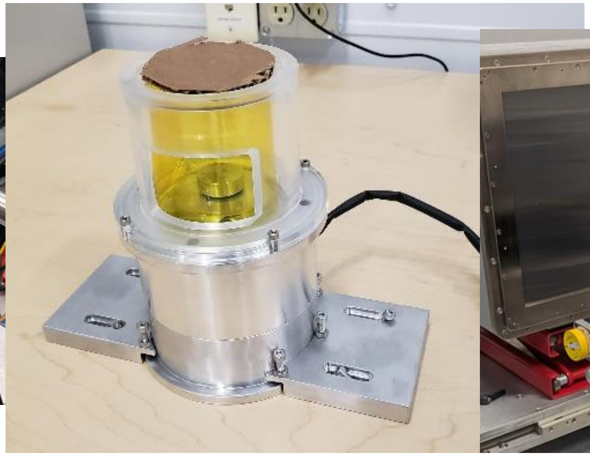
1200°C furnace with gas flow



Liquid flow cell and syringe pump

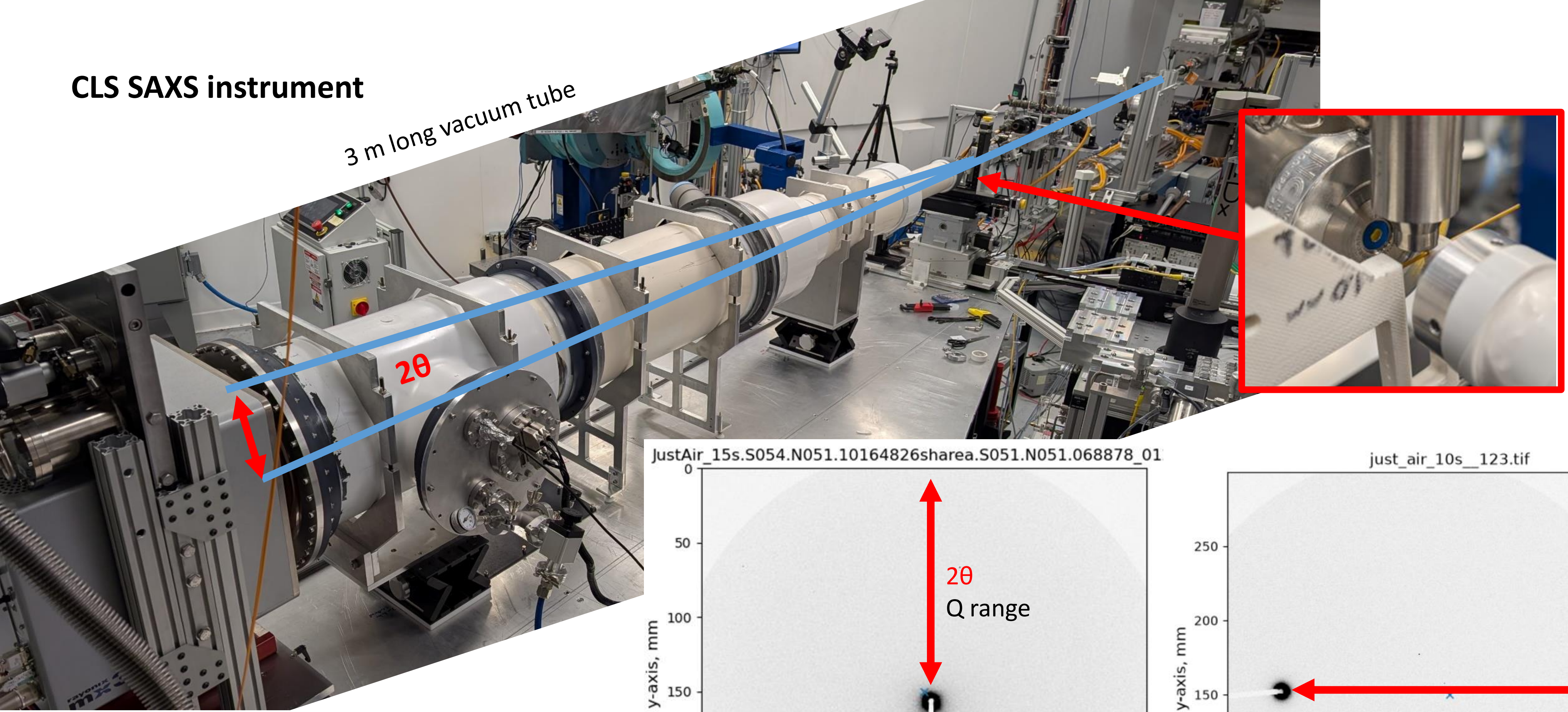


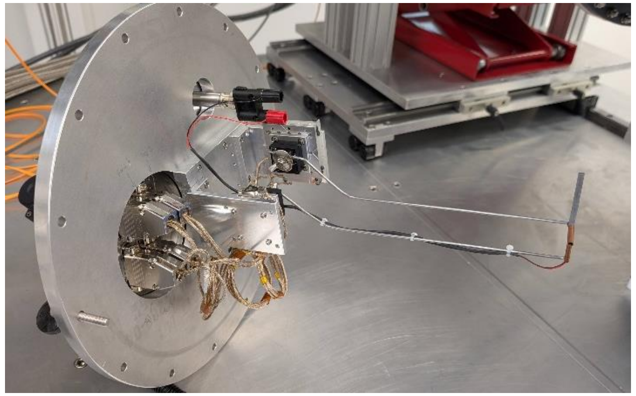
In-situ spin coater with heating

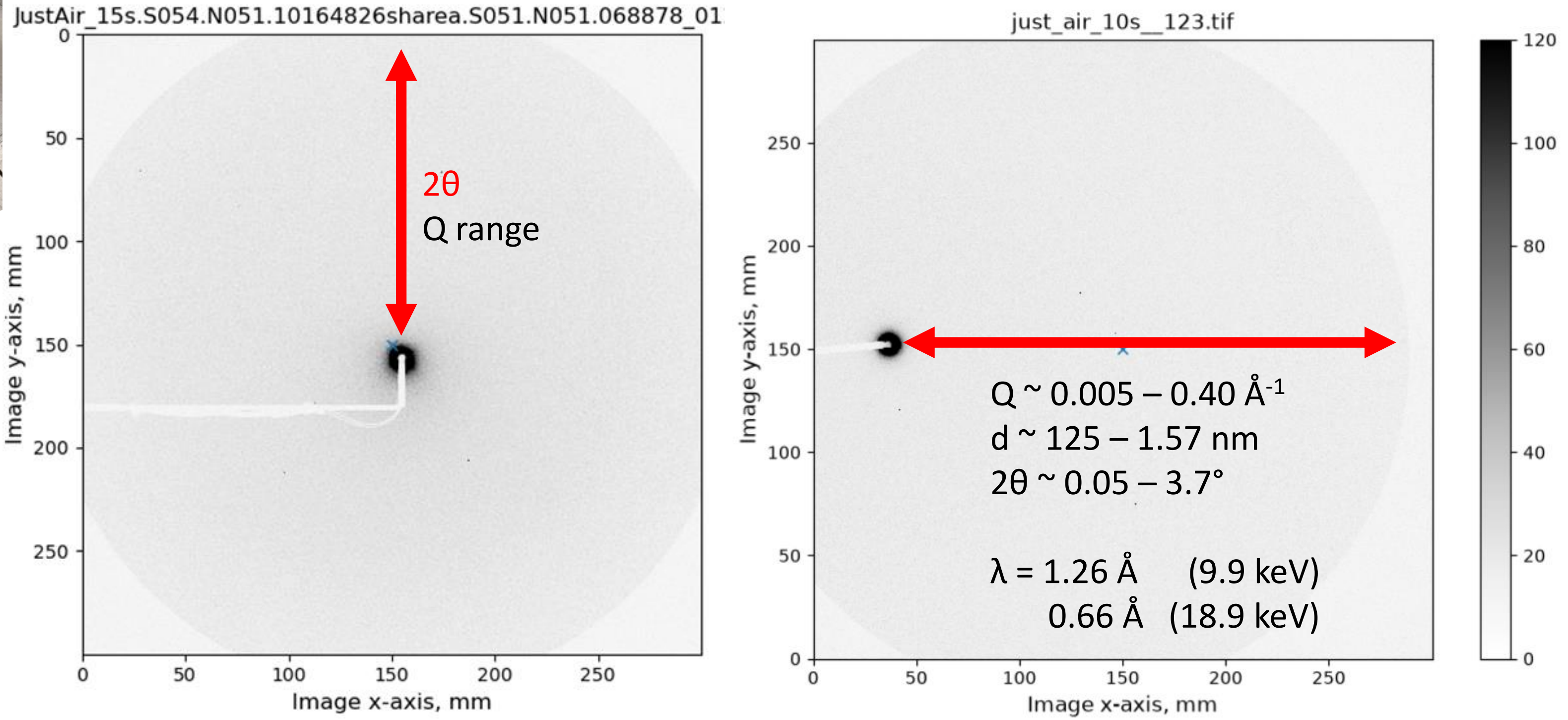


New shear stage

CLS SAXS instrument

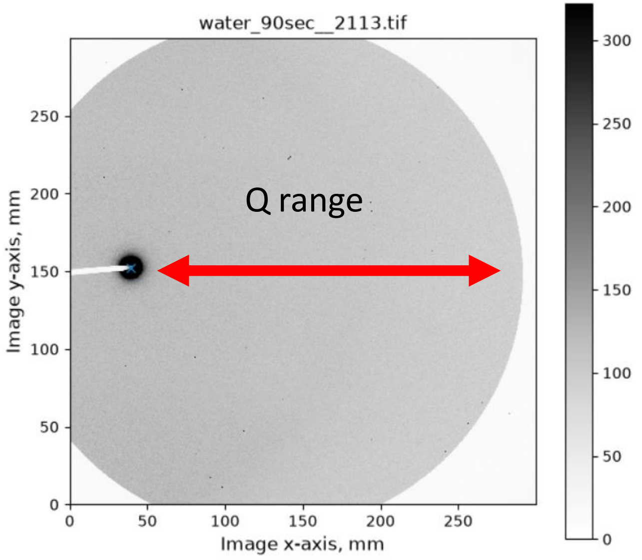


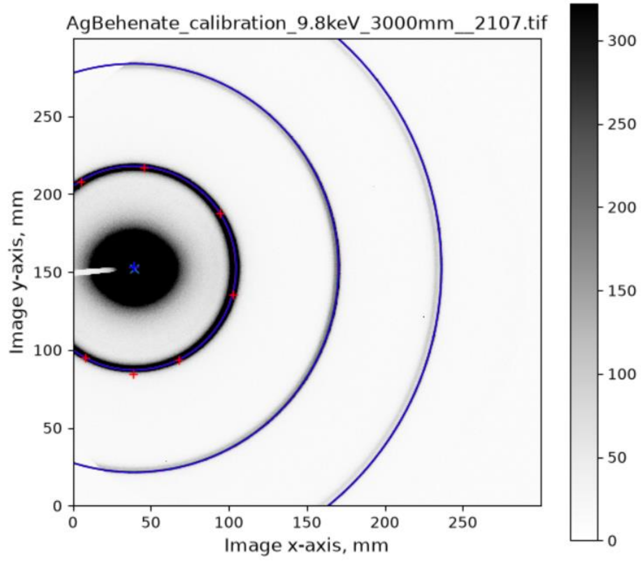


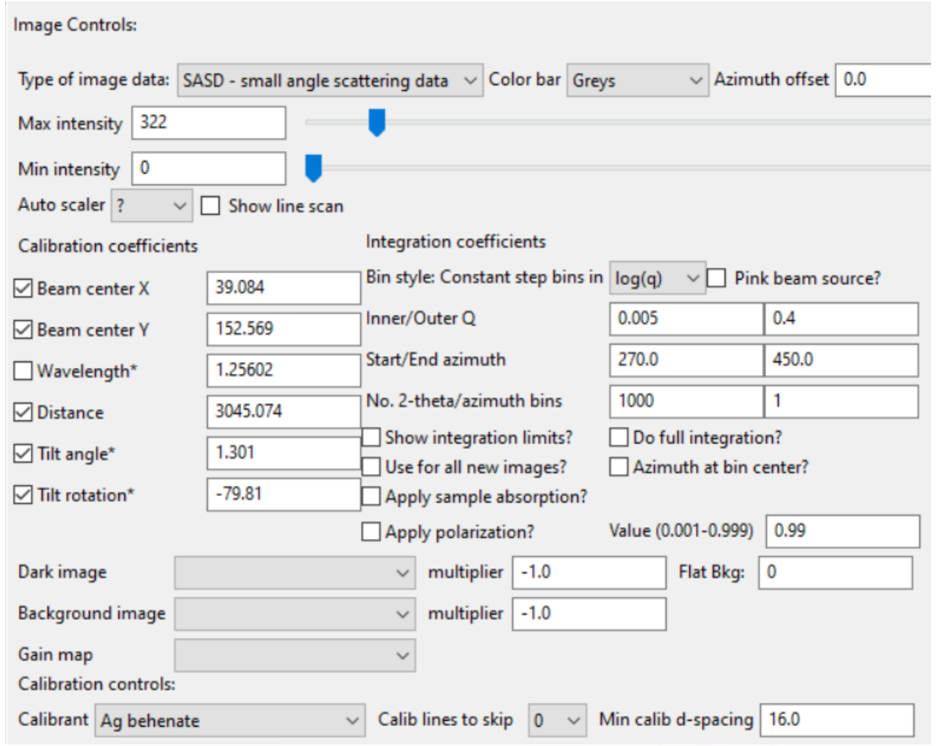


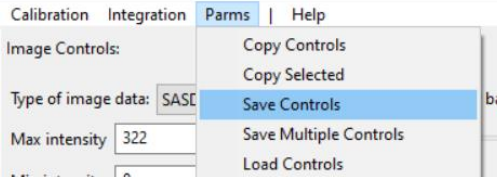
Detector acquisition and calibration

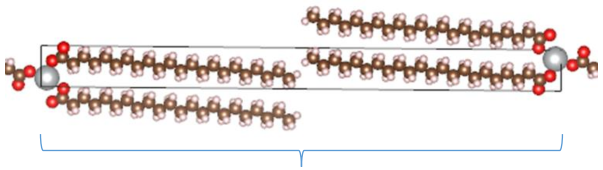
GSAS-II











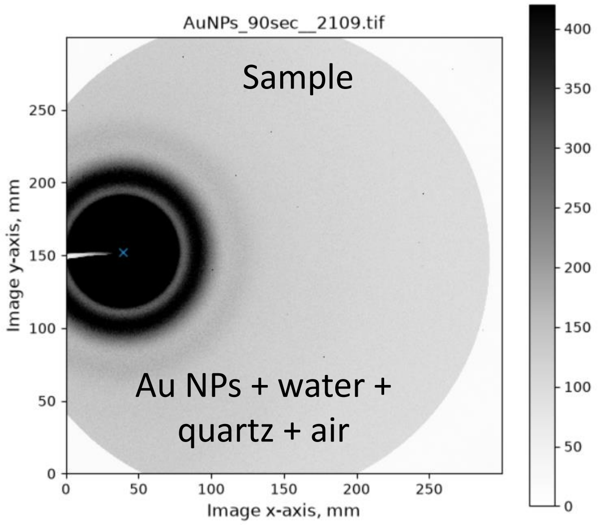
5.839 nm

Ring	q (Å^{-1})	d (nm)
001	0.1076	5.839
002	0.2152	2.920
003	0.3228	1.946
004	0.4304	1.460
005	0.5380	1.168

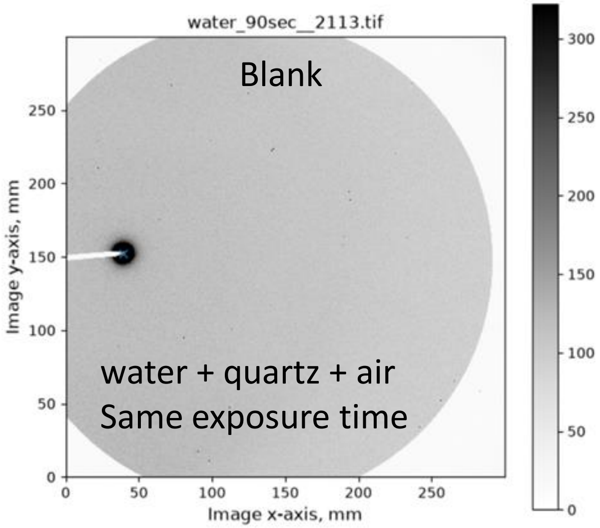
Need the wavelength, detector details, and approximate distance

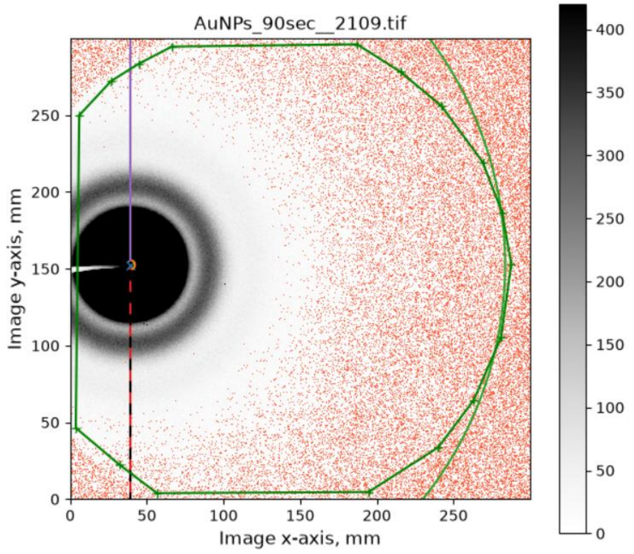
Canadian Light Source Centre canadien de rayonnement synchrotron

Data correction, and reduction to 1D plot

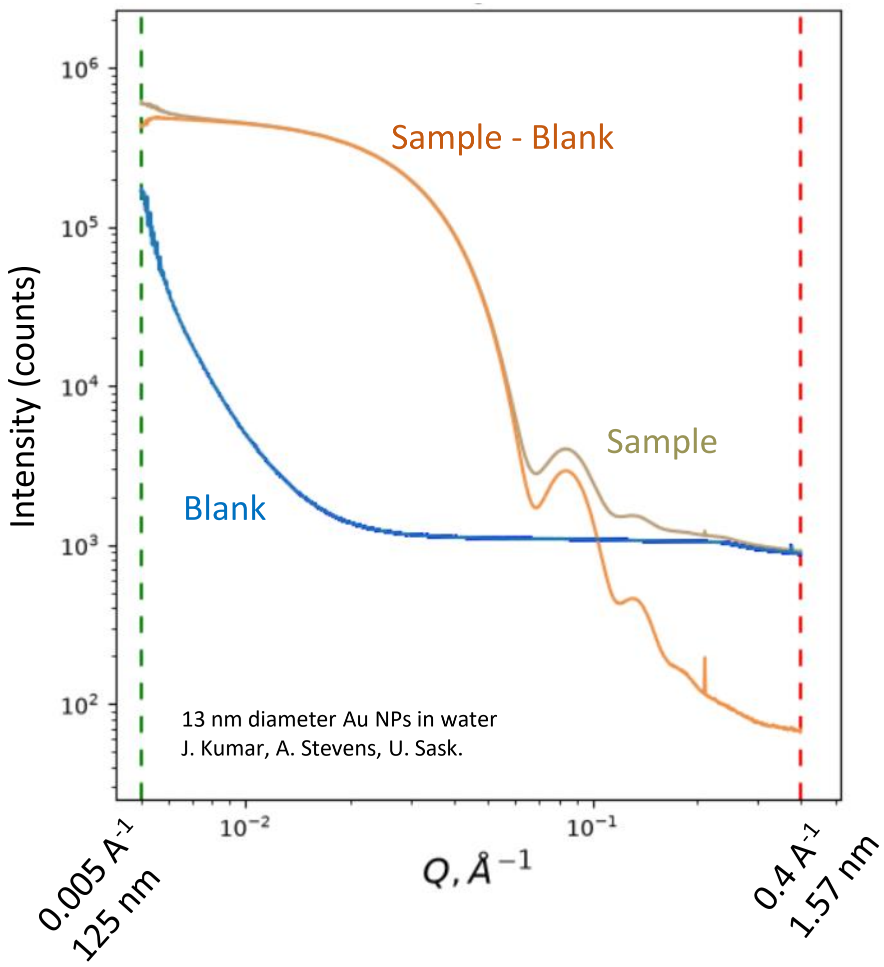


Acquisition time: 1 s - 90 s





Subtract the blank



Part 1: SAXS data calibration and reduction using GSAS-II
https://www.youtube.com/watch?v=BqnX_f0Hcdw

Part 2: SAXS data manipulation and analysis using BioXTAS RAW and SASView
https://www.youtube.com/watch?v=-Yab0XOpsug

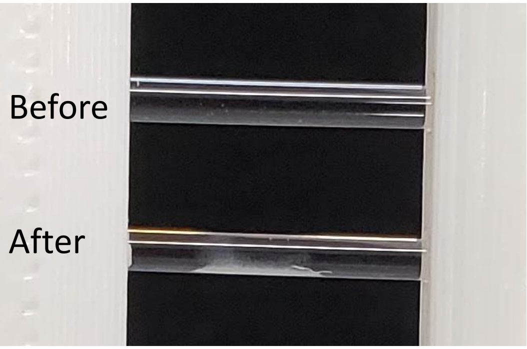
Some tips for a great data collection experience

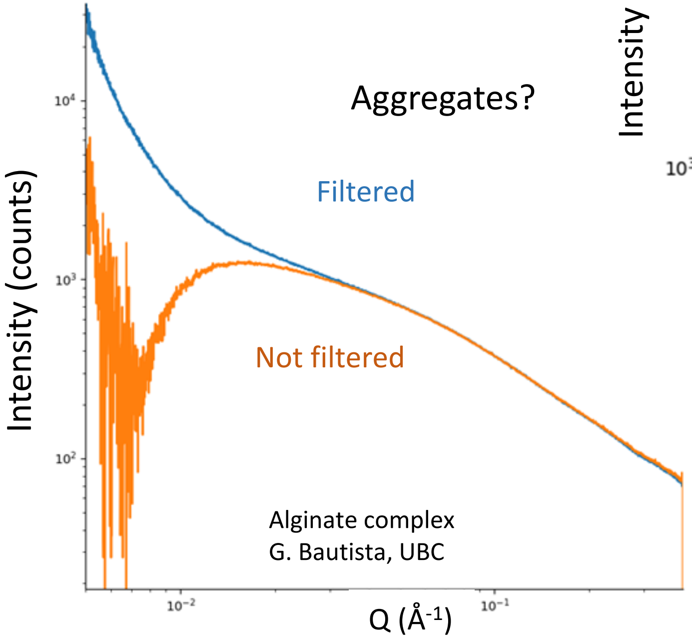
1) If the sample is in solution, bring blanks/solvent/buffer, and bring a range of concentrations (1 - 10 mg/mL)

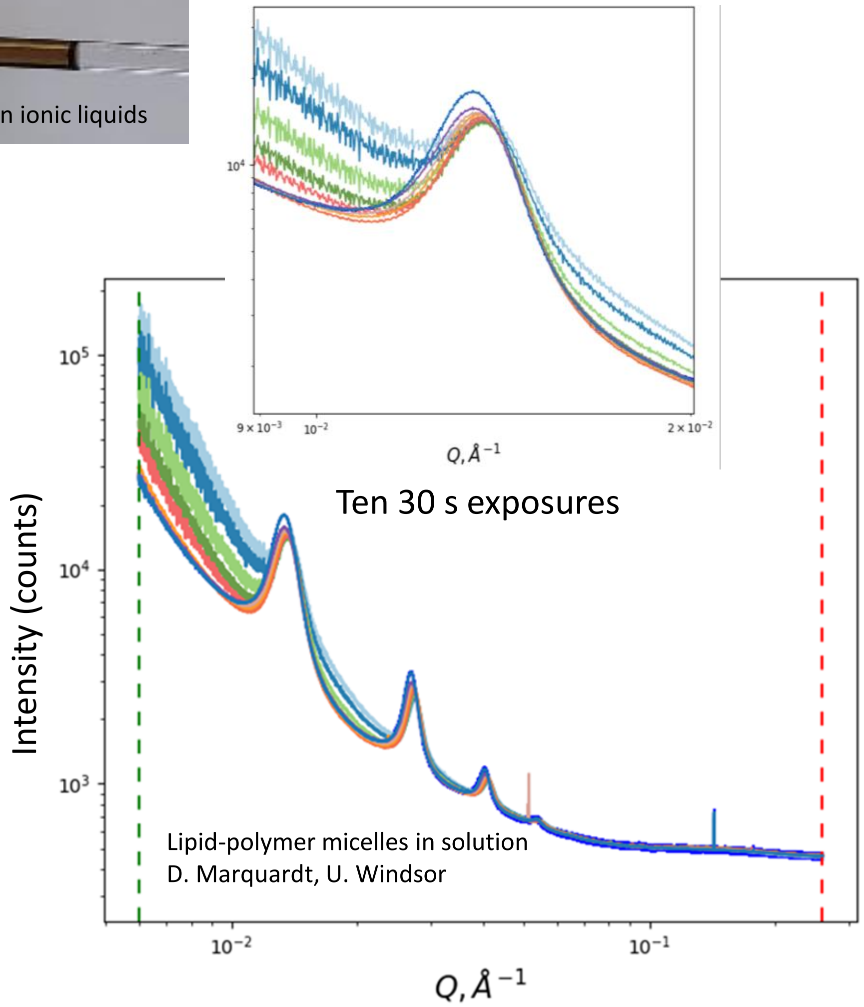
2) Have a good idea of what you're looking for. SAXS patterns can be ambiguous and there are numerous interpretations and models. Bring some examples.

3) Quality over quantity: Work up data as you go along

4) Buy your own capillaries







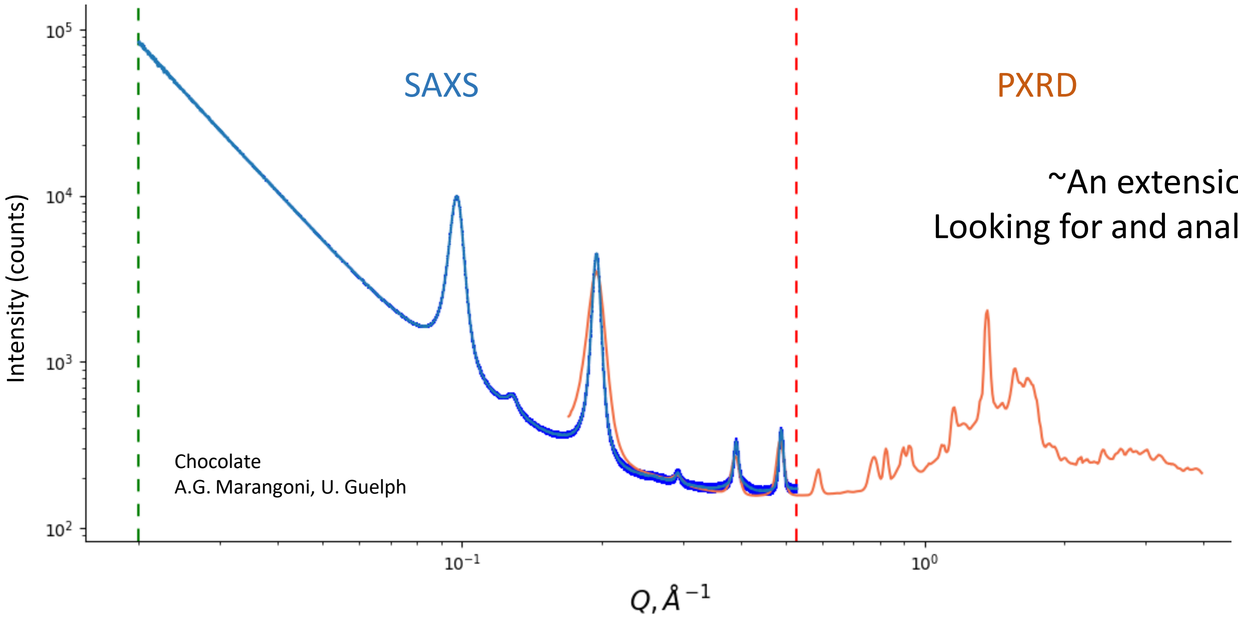
Data analysis with examples

Origins of the SAXS signal

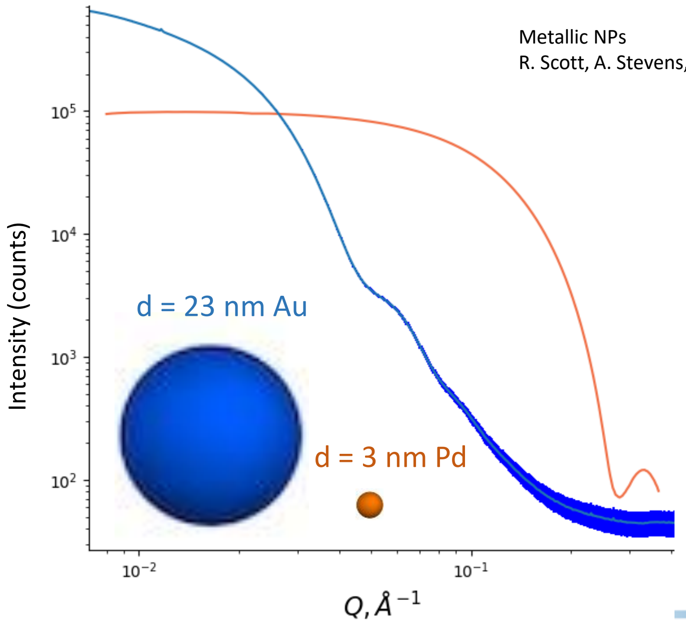
$$I(Q) = S(Q) \times P(Q)$$

S(Q) is the **structure** factor
- *Inter*-particle interferences
- High concentrations (>5% vol.)
- Ordering/packing of particles

P(Q) is the **form** factor
- *Intra*-particle interferences
- Low concentration (dilute limit)
- Size/polydispersity/shape of particles



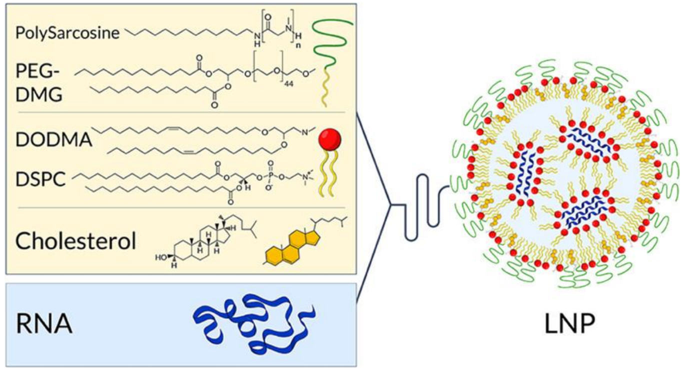
~An extension of PXRD
Looking for and analyzing Bragg peaks



Analyzing regions or the fitting the whole curve

Pharmacy: Liposomes for RNA delivery

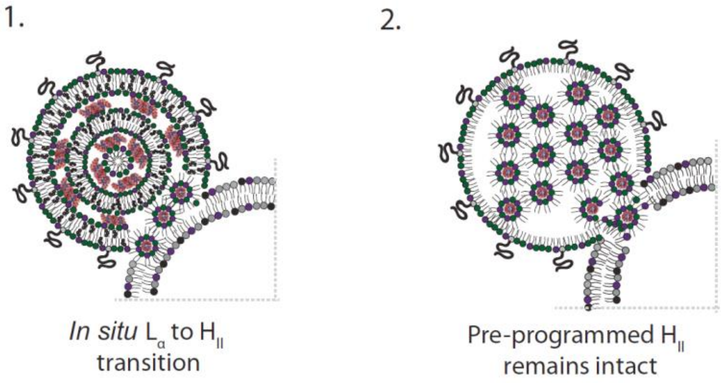
Pure mRNA degraded by enzymes in tissues
Hide it inside a liposome NP to get it into cells



ACS Appl. Nano Mater. 2020, 3, 11, 10634–10645

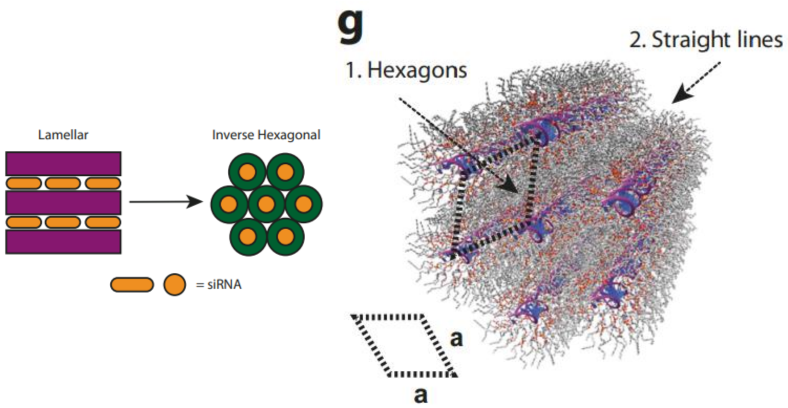
Pfizer, Moderna COVID-19 mRNA vaccines

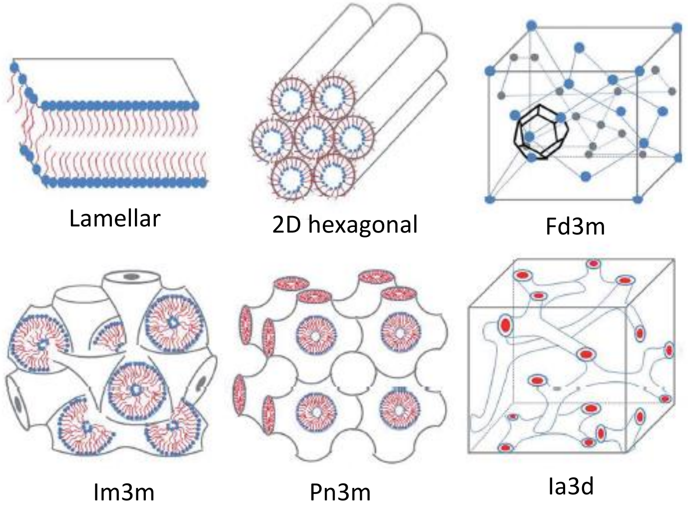
"transfection"



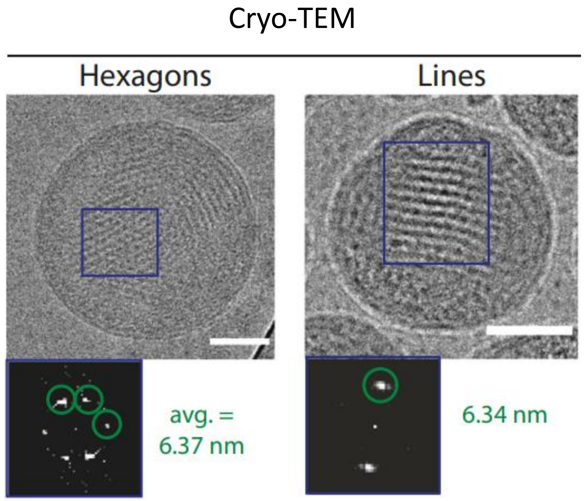
Nature Comm. 15, 1303 (2024)

Lipid phase affects transfection efficiency

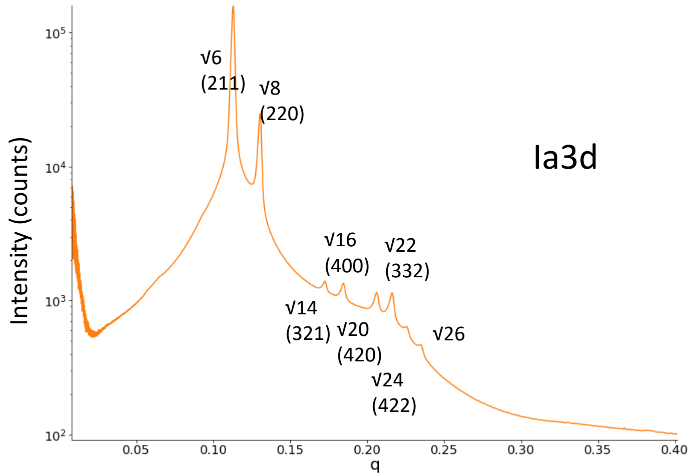




Y. Huang, S. Gui, RSC Adv., 2018, 8, 6978–6987



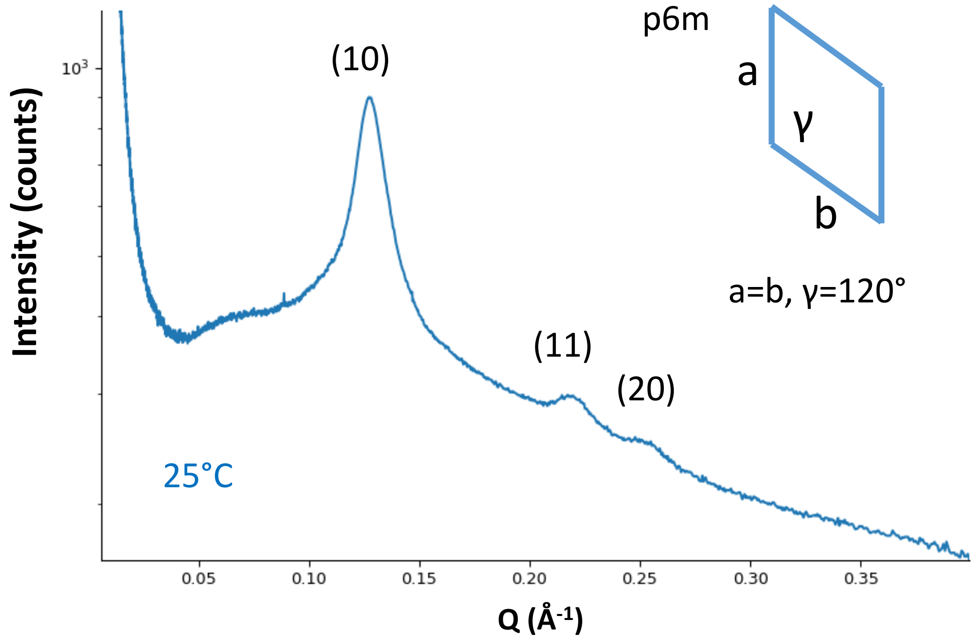
Nature Comm. 15, 1303 (2024)



Types of LLC phase	SAXS
Lamellar phase	1 : 2 : 3 : 4
Im3m	$\sqrt{2} : \sqrt{4} : \sqrt{6} : \sqrt{8}$
Pn3m	$\sqrt{2} : \sqrt{3} : \sqrt{4} : \sqrt{6} : \sqrt{8} : \sqrt{9}$
Ia3d	$\sqrt{6} : \sqrt{8} : \sqrt{14} : \sqrt{16} : \sqrt{20} : \sqrt{22}$
Fd3m	$\sqrt{3} : \sqrt{8} : \sqrt{11} : \sqrt{16} : \sqrt{19}$
Reverse hexagonal	$1 : \sqrt{3} : 2 : \sqrt{7}$

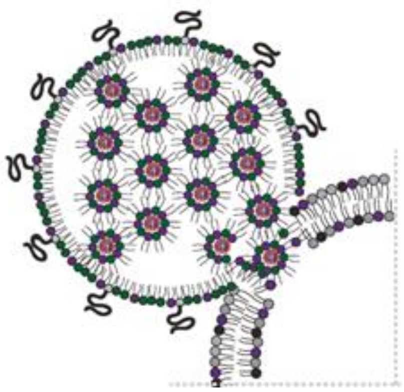
Pharmacy: Liposomes for RNA delivery

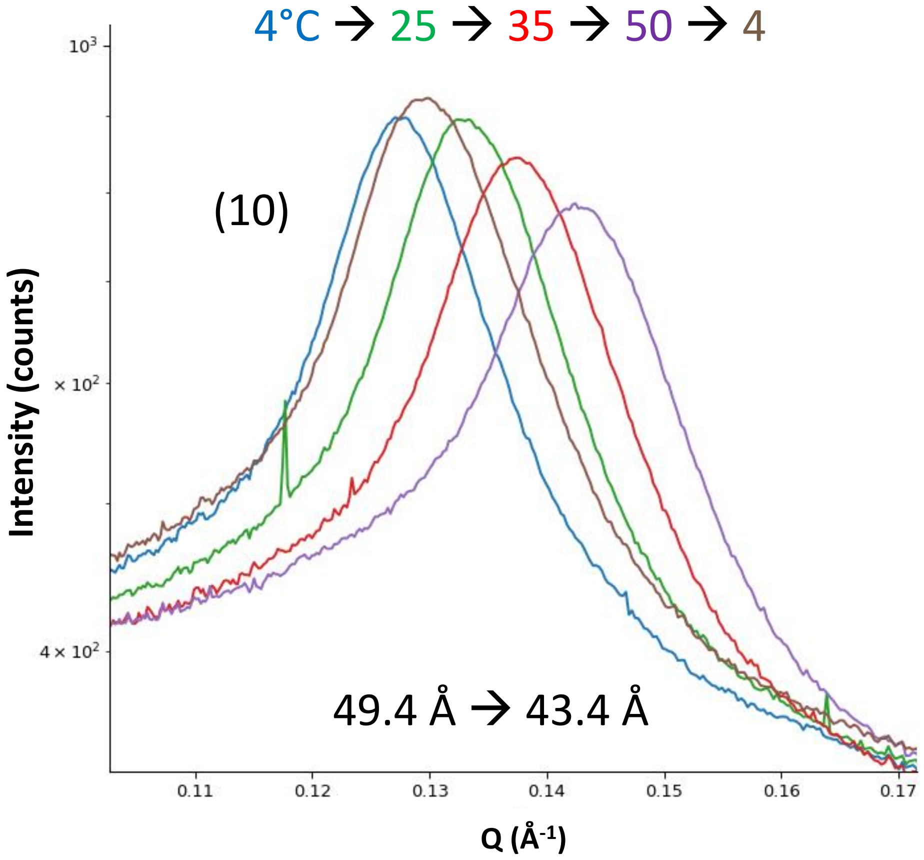
Naga Kola, Thakur Group, VIDO



2D hexagonal,
p6m

a=b, γ=120°





What happens with temperature?

What is happening here?
Is radiation damage at play?

ARTICLE

Received 7 Aug 2014 | Accepted 25 Nov 2014 | Published 7 Jan 2015 DOI: 10.1038/ncomms6948 OPEN

Volume and porosity thermal regulation in lipid mesophases by coupling mobile ligands to soft membranes

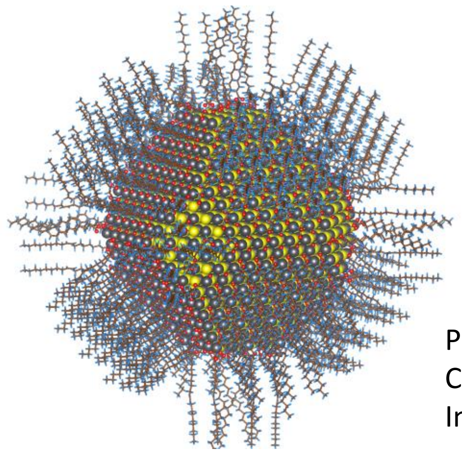
Lucia Parolini[1], Bortolo M. Mognetti[2], Jurij Kotar[1], Erika Eiser[3], Pietro Cicuta[1] & Lorenzo Di Michele[1]

Nat. Comm. 6, 5948 (2015)

Canadian Light Source
Centre canadien de rayonnement synchrotron

Energy materials: Quantum dot solar cells

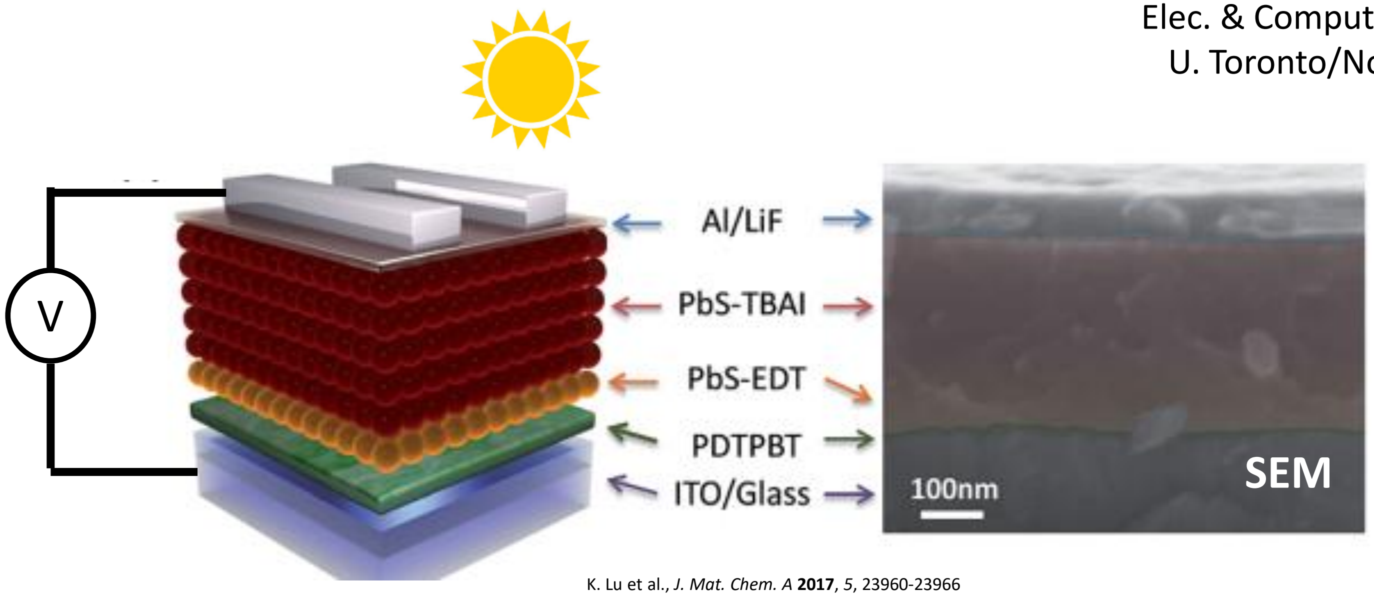
Sargent group
Elec. & Computer Engineering
U. Toronto/Northwestern U.



PbS
$CsPb(Br/I)_3$
InAs

https://www.olcf.ornl.gov/2015/05/05/demystifying-quantum-dot-conundrums/

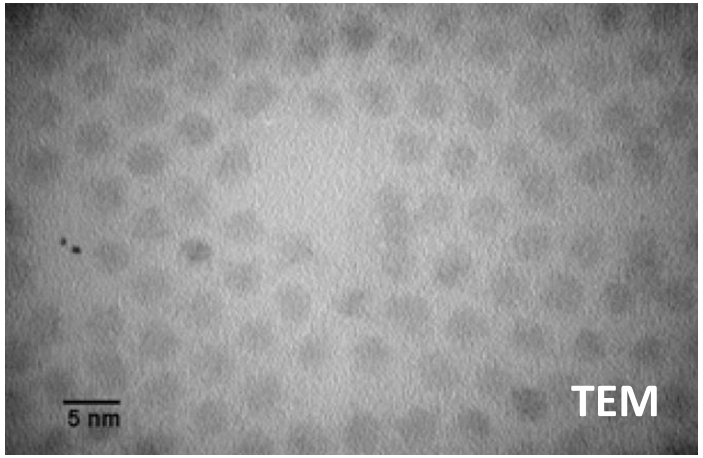
Efficient exciton generation
Size-based, tune-able band gap



K. Lu et al., *J. Mat. Chem. A* **2017**, *5*, 23960-23966

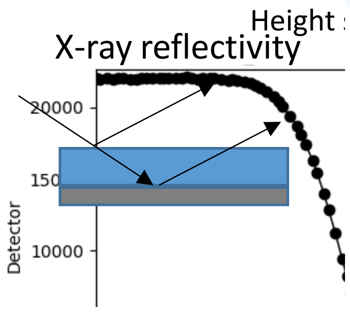
QD films deposited layer-by-layer using spin coating
Top electrodes deposited using thermal evaporation

18.1% record efficiency in 2022
Performance improved by tuning:
- Particle size distribution or polydispersity
- How particles pack and the interparticle distance



M. Yuan et al., Adv. Mater. 2014, 26, 3513–3519

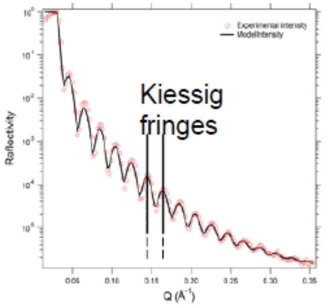
Control the size and packing by:
- Ligand exchanges cycles, centrifuge to remove largest QDs
- Rinsing steps during buildup
- Spin speeds, solvents, additives

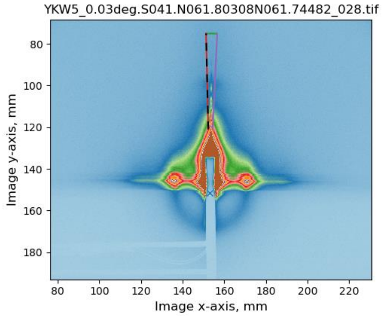


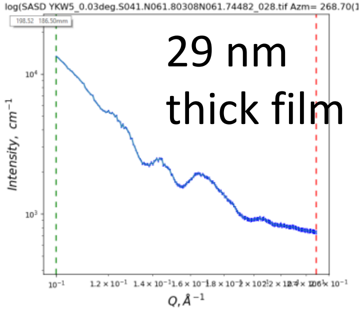
Simple estimation of film thickness

Fringes with uniform spacing

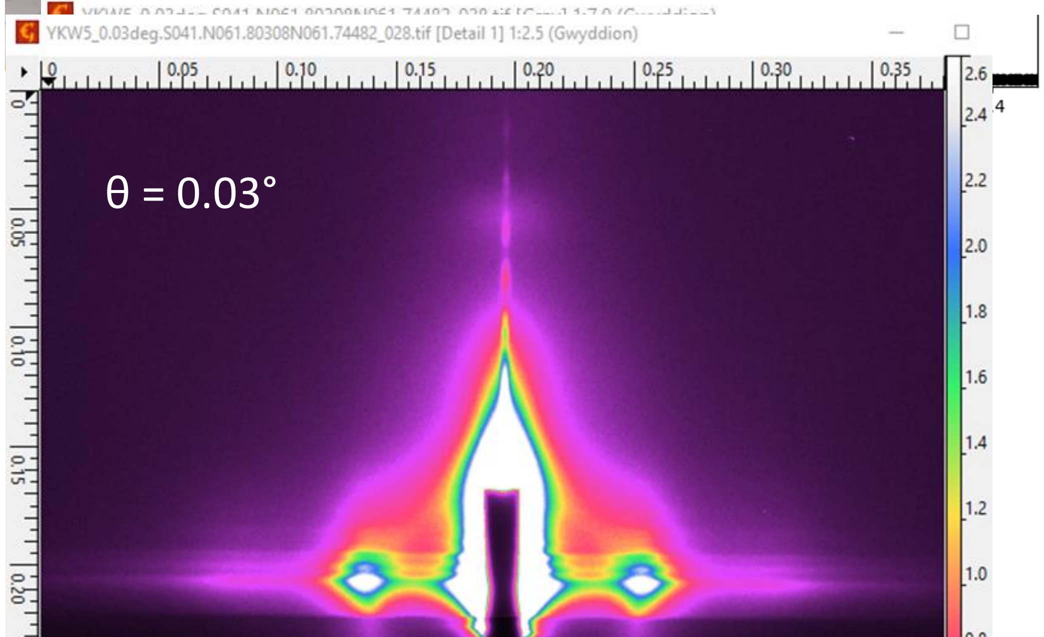
Thickness of the layer : $t = \frac{2\pi}{\Delta q_z}$

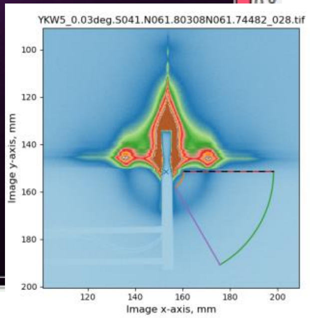


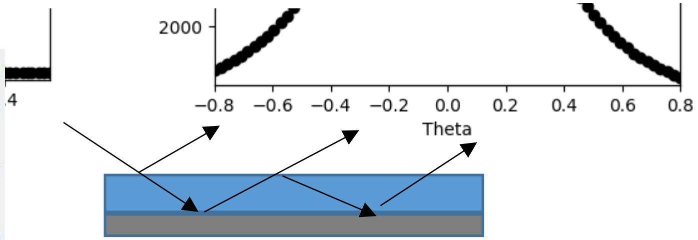




- Reflectivity gives film thickness

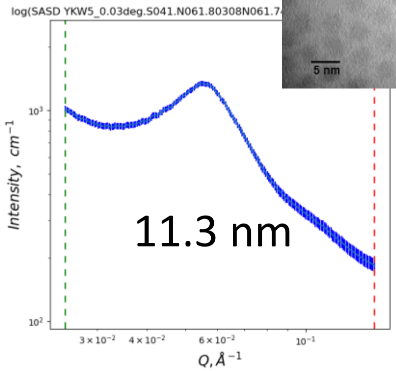


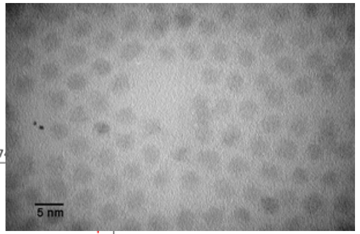


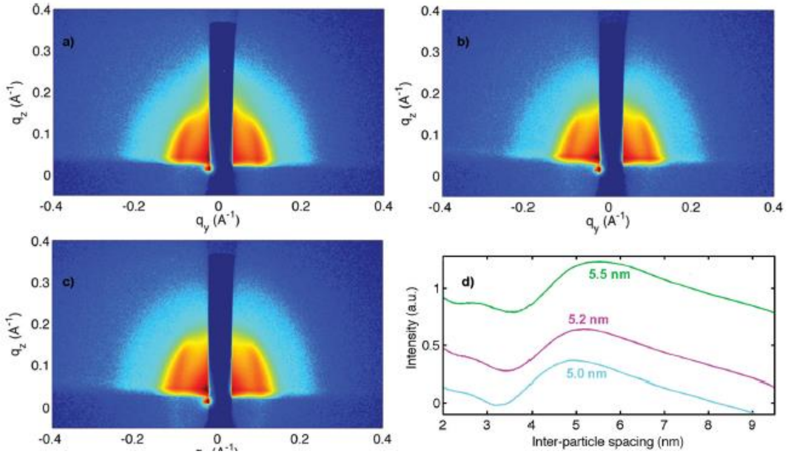


- Position gives interparticle distance
- Peak width gives size distribution
- Average over relatively huge area

- Indicates very flat, high quality film
- Adjusting grazing angle can give depth information







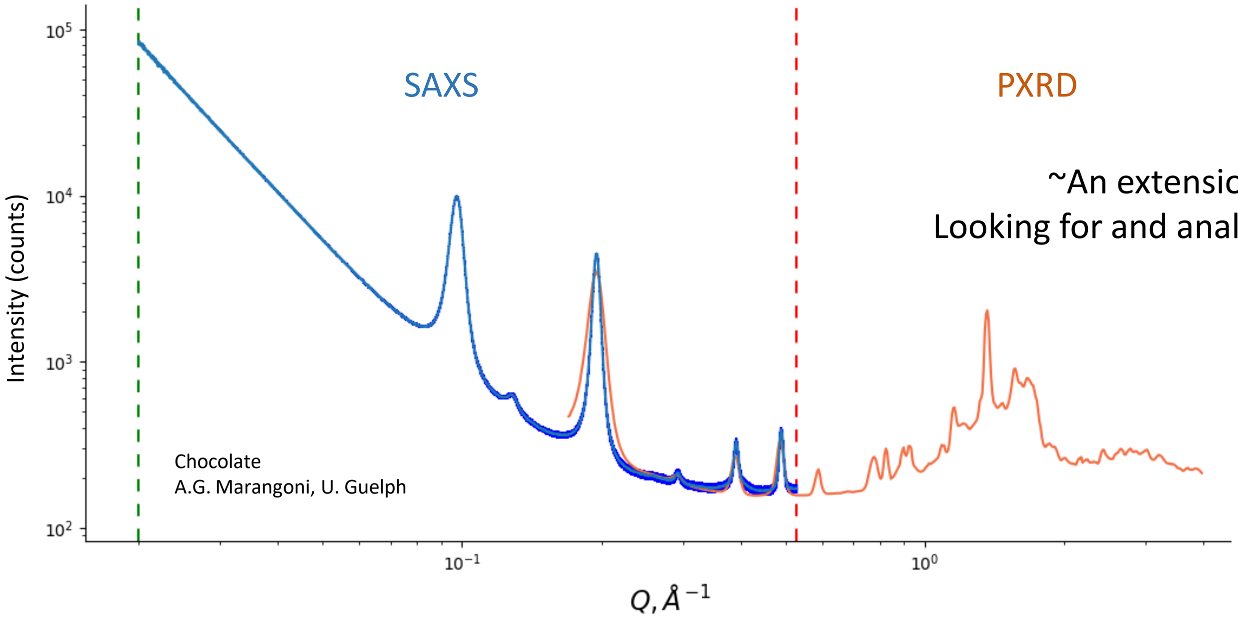
M. Yuan et al., Adv. Mater. 2014, 26, 3513–3519

Canadian Light Source
Centre canadien de rayonnement synchrotron

Origins of the SAXS signal

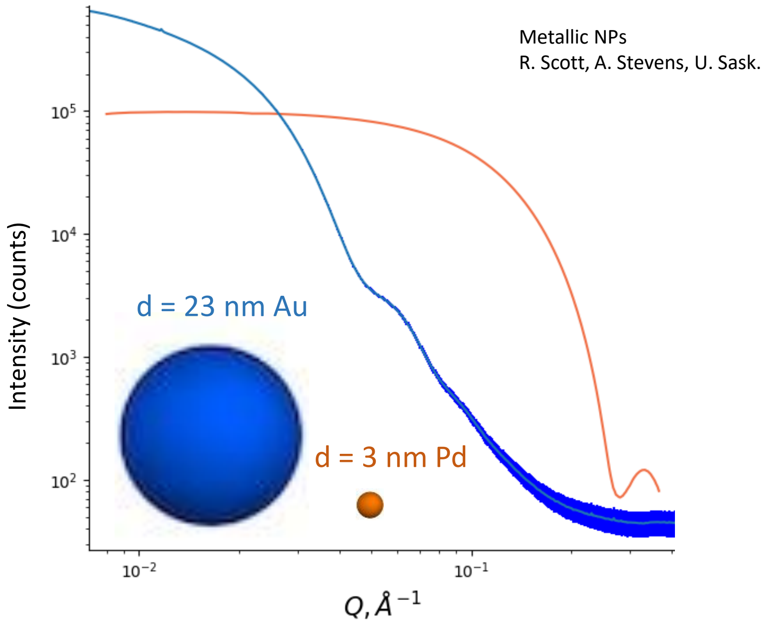
$$I(Q) = S(Q) \times P(Q)$$

S(Q) is the **structure** factor
- *Inter*-particle interferences
- High concentrations (>5% vol.)
- Ordering/packing of particles



~An extension of PXRD
Looking for and analyzing Bragg peaks

P(Q) is the **form** factor
- *Intra*-particle interferences
- Low concentration (dilute limit)
- Size/polydispersity/shape of particles



Analyzing large regions or the whole curve

Form factor, P(Q)

- *Intra*-particle interferences
- Low concentration (dilute limit)
- Size, shape, polydispersity of particles

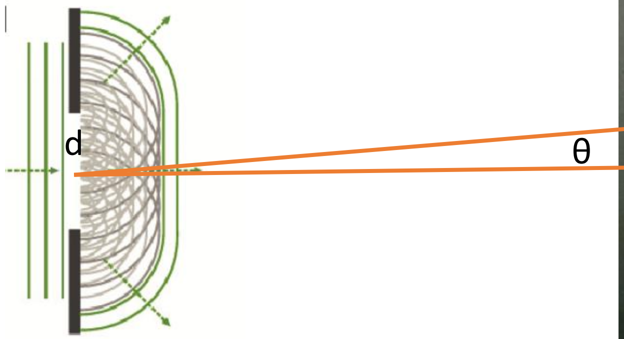
120 nm diameter PS spheres in water

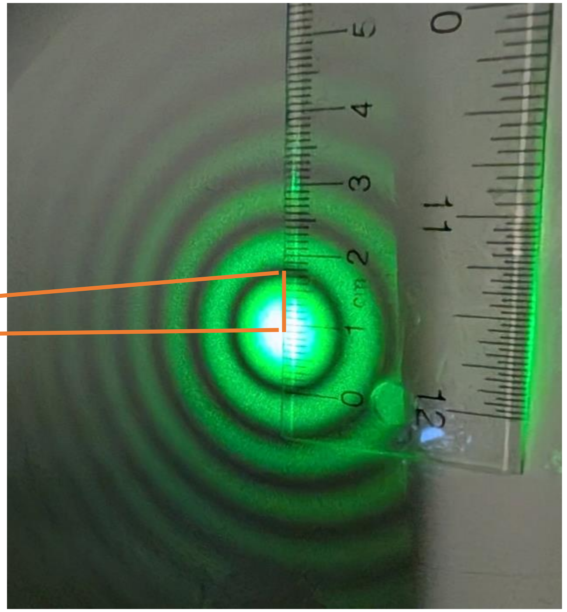
Pure, monodisperse, and dilute
(~1 – 10 mg/mL) - no interparticle interactions

Airy pattern

Monochromatic beam

λ = 532 nm

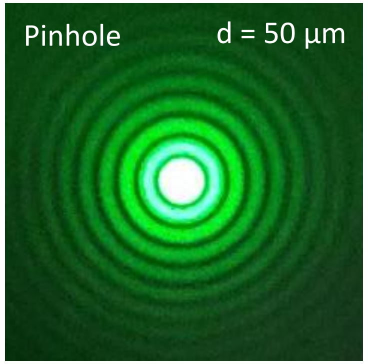


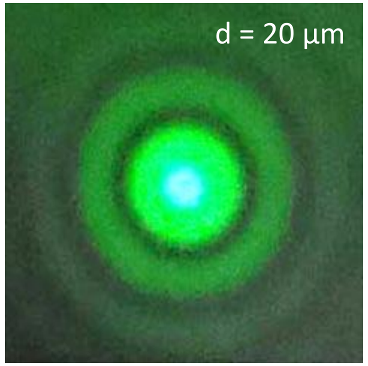


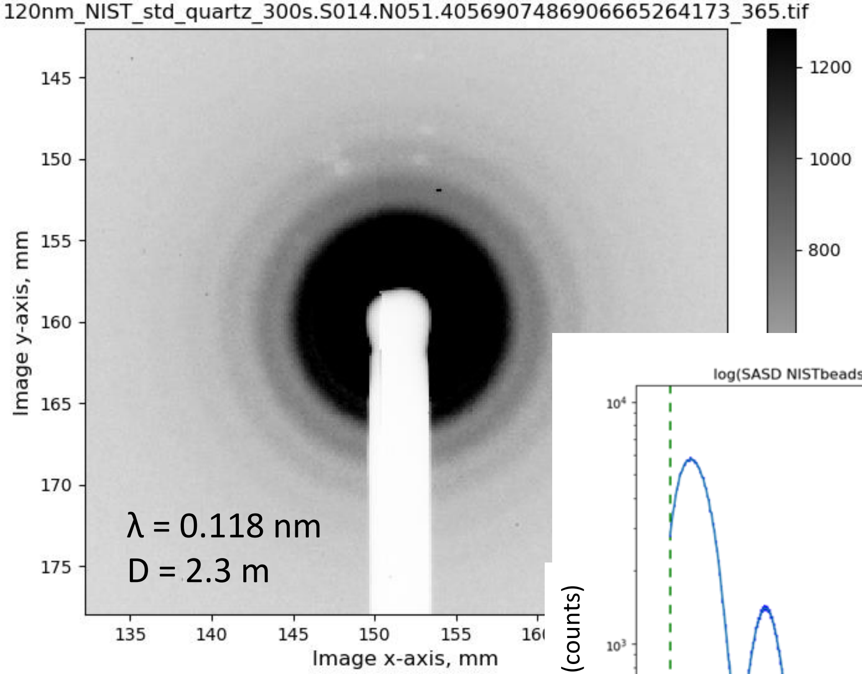
1st minima observed at

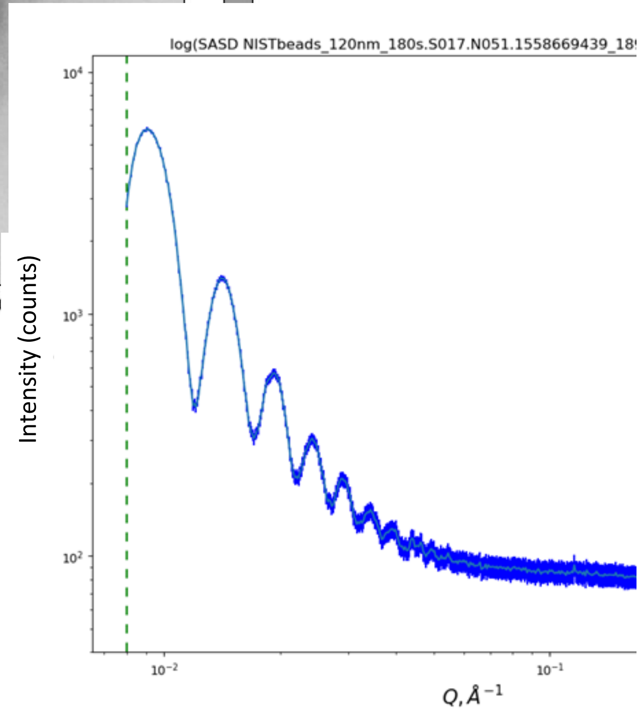
$$\frac{\lambda}{sin\theta} = d$$

λ = 532 nm
D = 1.0 m

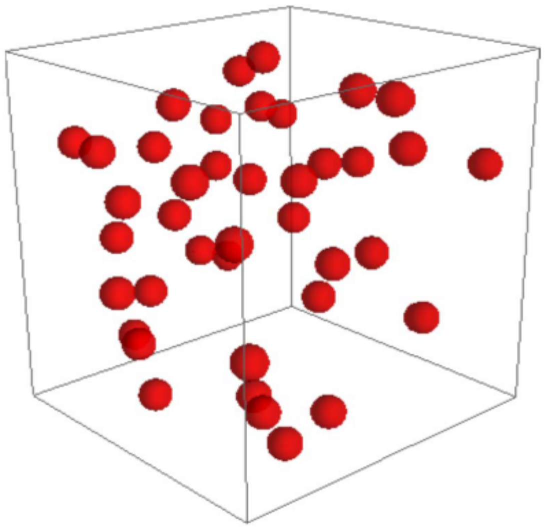






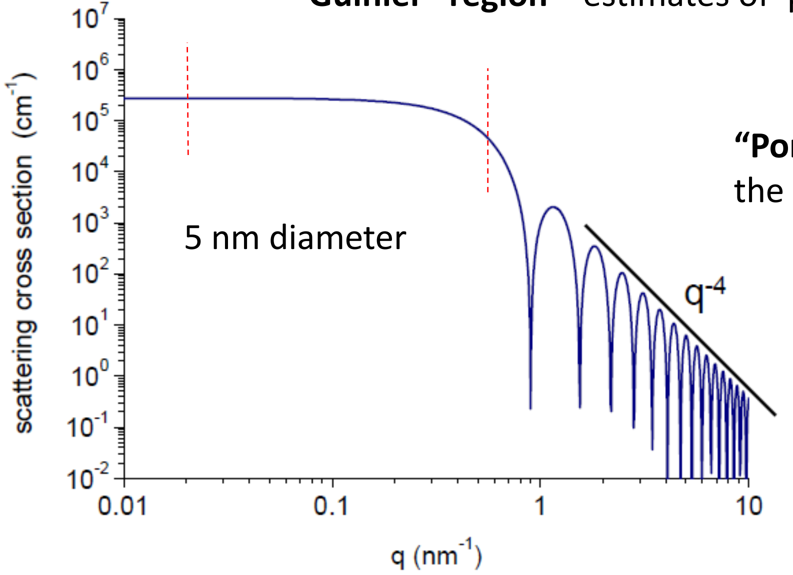


Monodisperse, dilute spheres in solution

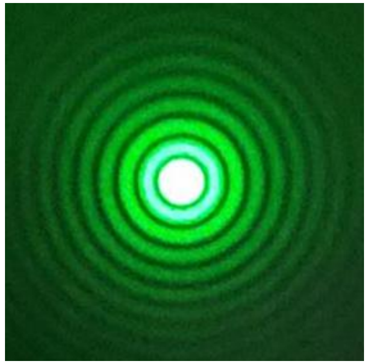


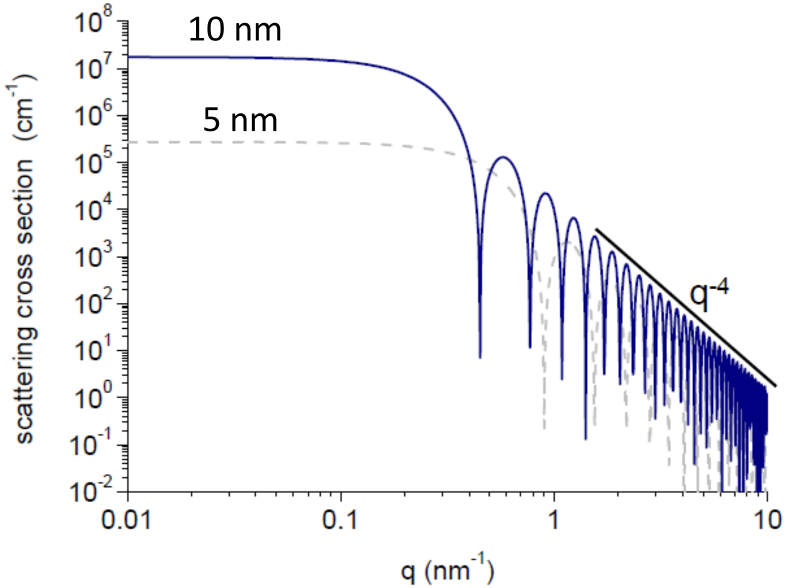
$$P(q) = \left[3\,\frac{\sin(qR) - qR\cos(qR)}{(qR)^3} \right]^2$$

"Guinier" region – estimates of 'particle' size

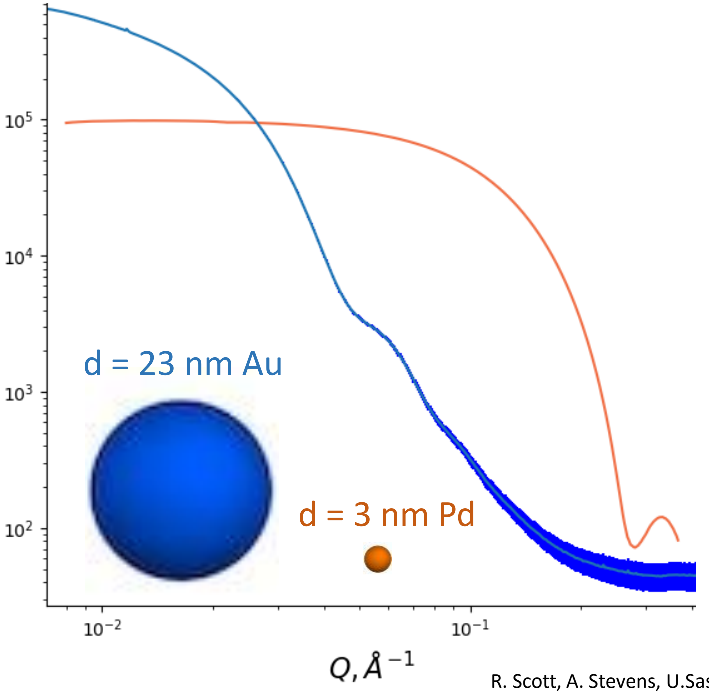


"Porod" region - Clues to the nature of the scattering objects





Real samples, spherical metallic NPs

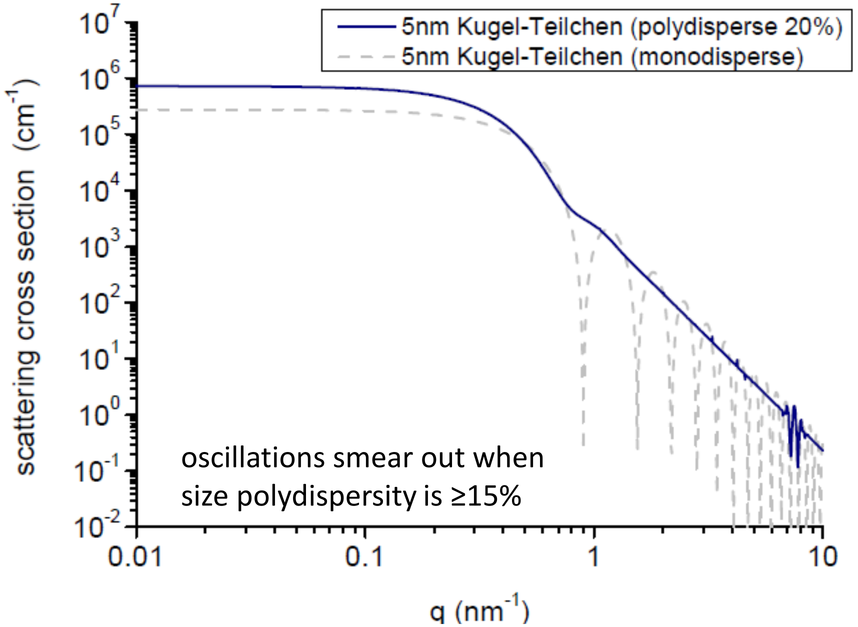


R. Scott, A. Stevens, U.Sask

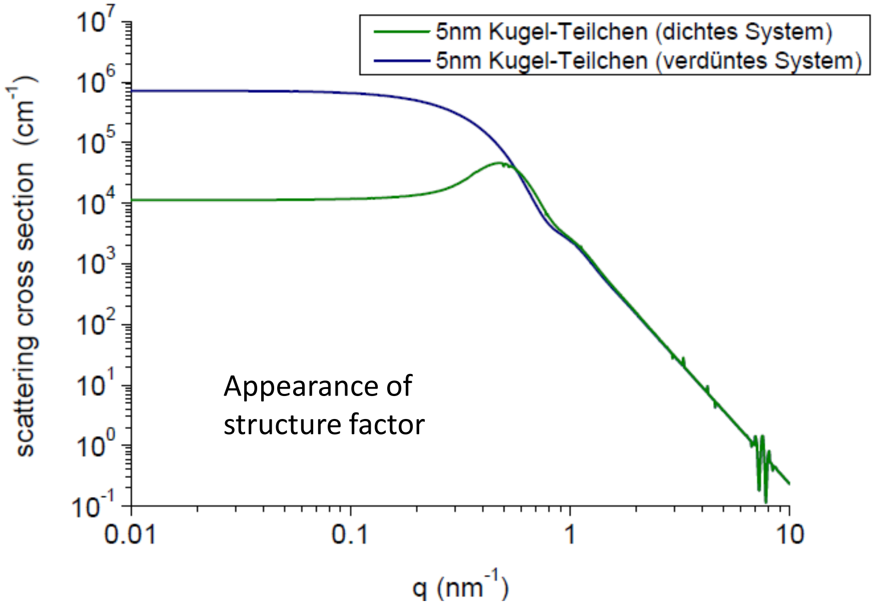
Armin Hoell

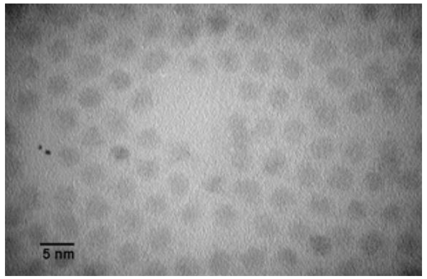
Complications…

Polydispersity?

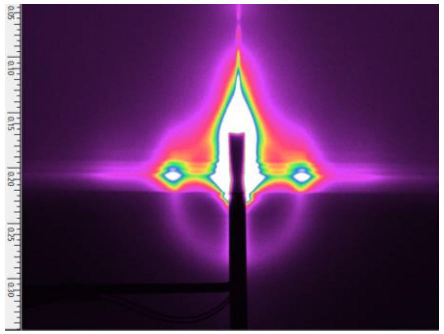


Too concentrated?

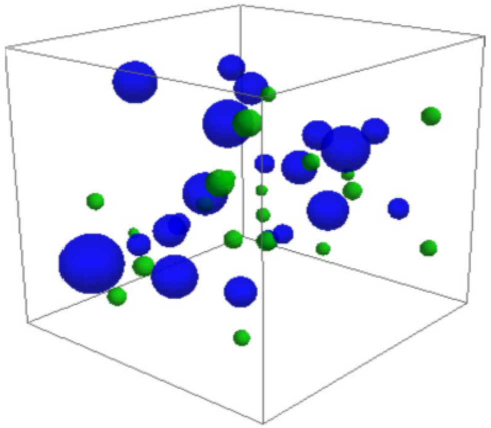


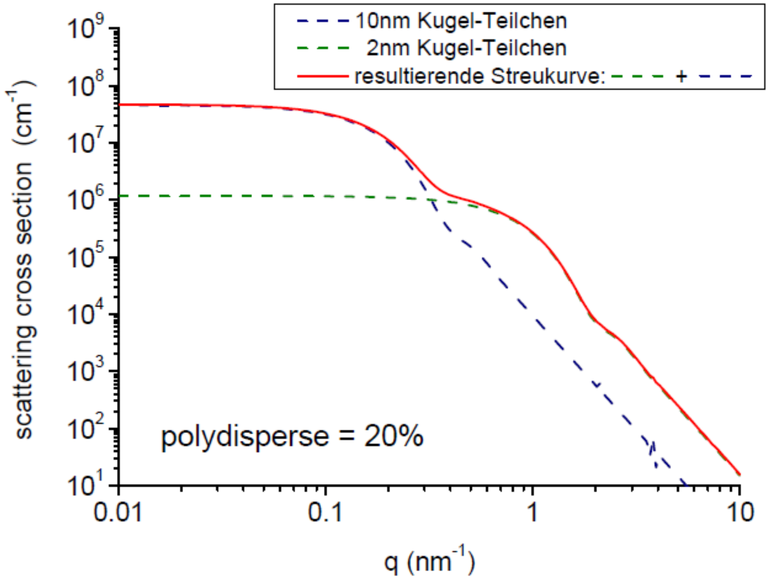


M. Yuan et al., Adv. Mater. 2014, 26, 3513–3519



Several
populations?





SAXS data interpretation can be ambiguous, especially if the sample is not pure, not dilute and/or not monodisperse

'Particle' size: Guinier plots

Guinier's approximation: $I(q) \approx I(0)e^{-q^2 R_g^2/3}$

R_g: Radius of gyration
I(0): Intensity at q=0

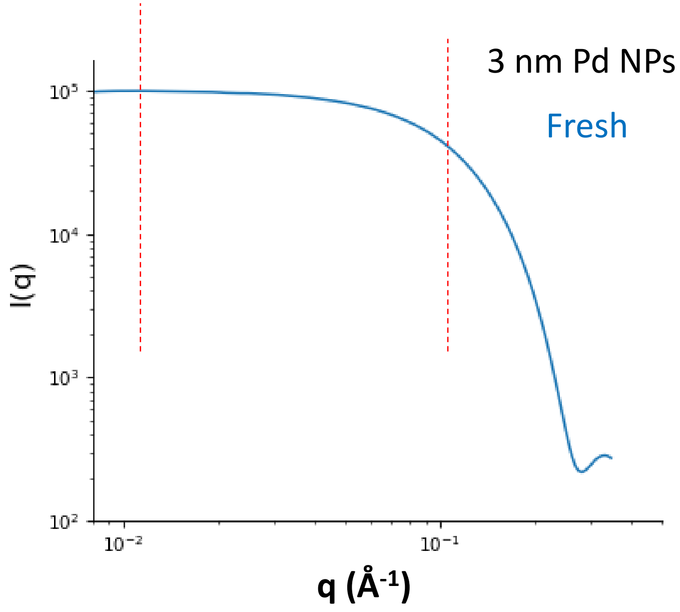
R_g is the square root of the average squared distance of each scatterer from the particle center

RMS distance of the objects parts from its center of mass

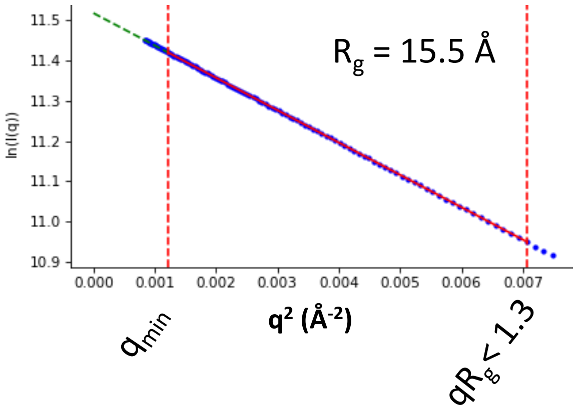
- ➢ Particle radius

3 nm Pd NPs

Fresh



"Guinier plot"



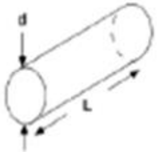
Slope: $-R_g^2/3$
Intercept: ln I_0

I_o contains information about molecular weight of the particle

Sphere  $R_g^2 = \frac{3}{5}R^2$

Thin rod $R_g^2 = \frac{L^2}{12}$

Thin disc $R_g^2 = \frac{R^2}{2}$

Cylinder $R_g^2 = \frac{d^2}{8} + \frac{L^2}{12}$ 

How big of an object?

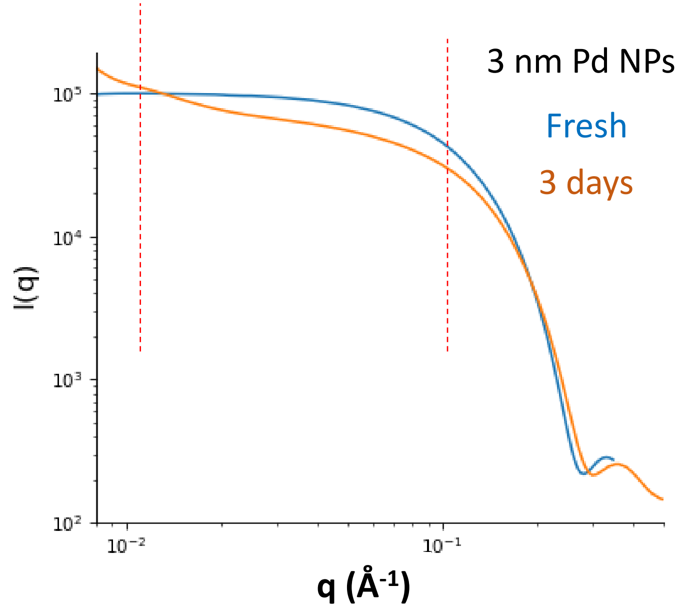
q range required	If q_{min}= 0.005 A^{-1}
Globular, disc: $q_{min}*R_g$ <1.0 to ~1.3	**$R_g$max = 20 nm**
Linear: $q_{min}*R_g$ <0.65 to ~1.0	$R_g$max = 13 nm

https://bioxtas-raw.readthedocs.io/en/latest/saxs/saxs_guinier.html
D. Putnam et al. Quart. Rev. Biophys. 40, 191-285 (2007)

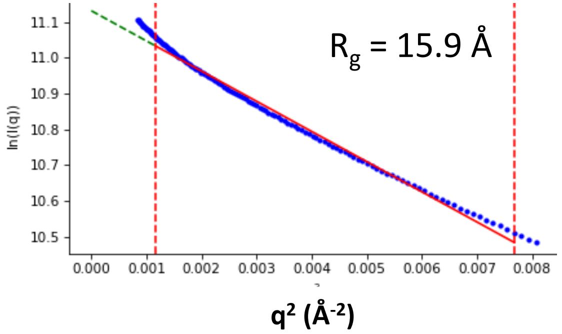
‘Particle’ size: Guinier plots

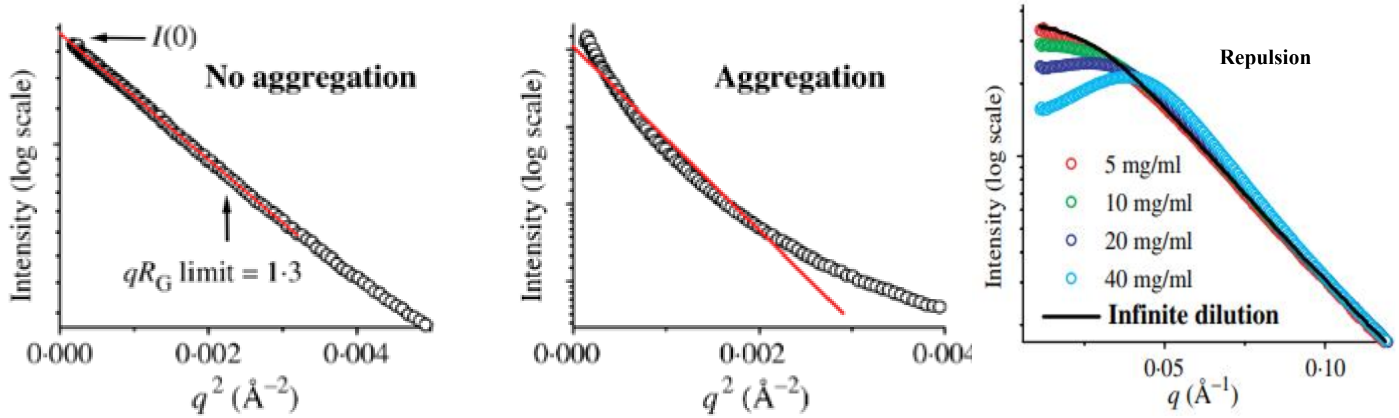
Guinier’s approximation: $I(q) \approx I(0)e^{-q^2 R_g^2/3}$

➢ Sample quality: non-linearity can indicate aggregation, repulsion, radiation damage



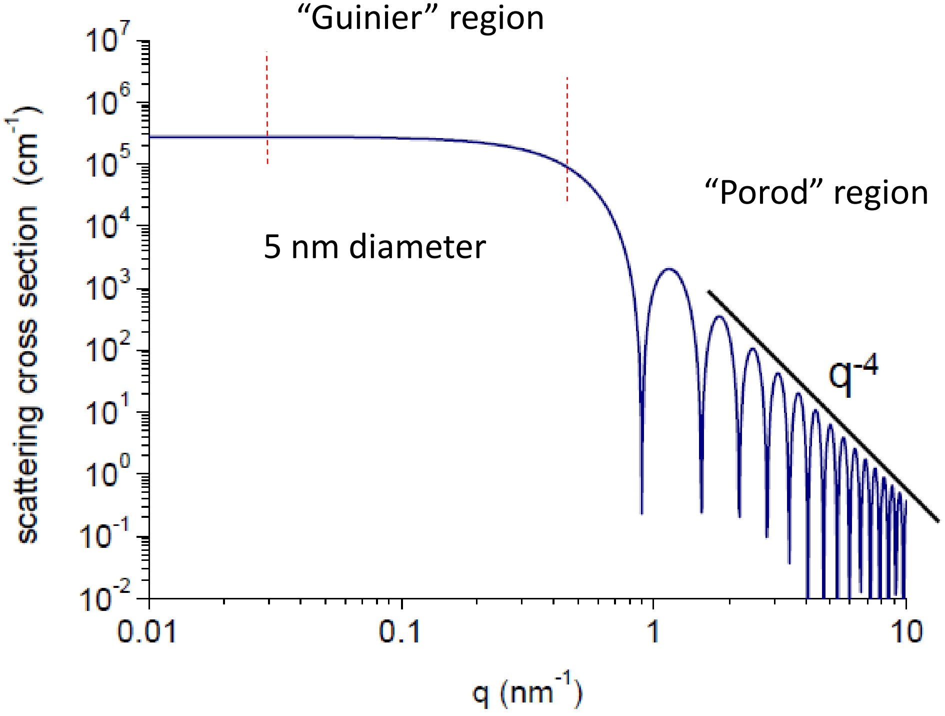
Guinier plot





D. Putnam et al. Quart. Rev. Biophys. 40, 191-285 (2007)

Porod exponent



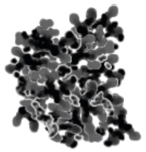
Scattering intensity in this region arises from surfaces or interfaces, and is related to the particle surface, shape, and/or flexibility

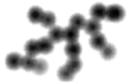
Porod's law states that at high q scattering intensity decays following a power law,

$$I(q) \propto q^{-D}$$

D is the Porod exponent, and can give some evidence of particle shape, surface, and/or flexibility

4	Hard sphere/sharp interfaces, 3D object, or a very polydisperse sample
3 – 4	A rougher surface, 3D object
2 – 3	Thin disc, or sheet, 2D object, a more open or porous microsctruture
1 – 2	Needle-like, stiff rods, a fully extended 1D structure

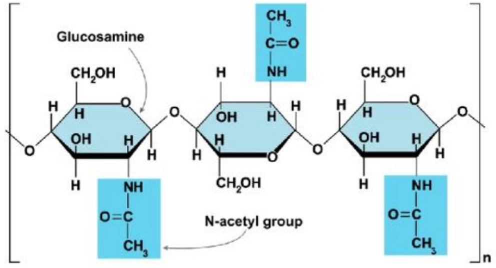




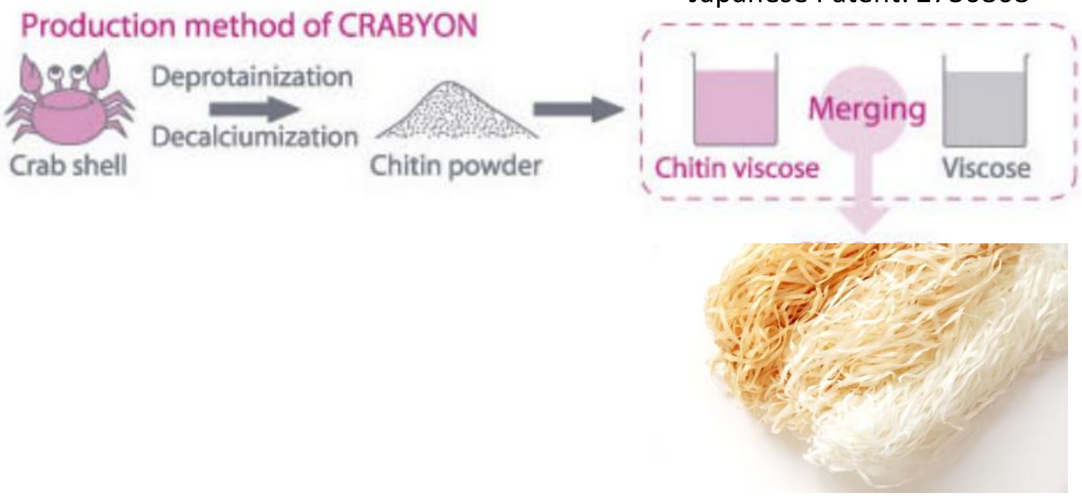
Canadian Light Source Centre canadien de rayonnement synchrotron

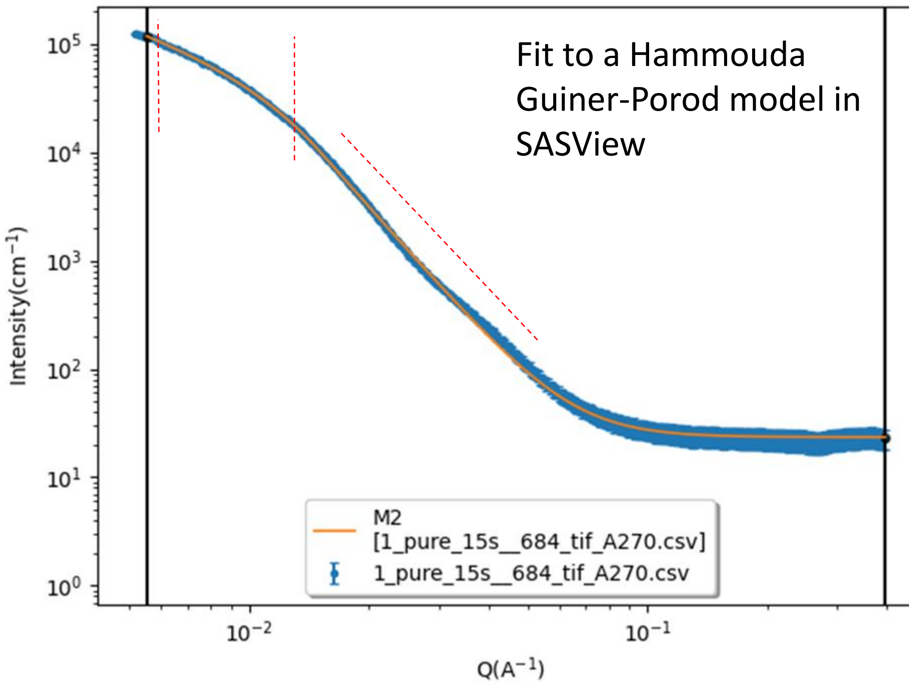
Biomineralization phenomena in biofilaments based on nanochitin

Tianyu Guo, Rojas group, UBC



Japanese Patent: 2736868





Chitin is a polysaccharide, found in the exoskeletons of crustaceans and insects.

It can be spun into fibers and thread or made into textiles. These materials could replace synthetic fibers like nylon and polyester made from petroleum and tend to shed microplastics.

Moisture and humidity weakens the mechanical strength and durability.

Nanochitin composite, bio mineralized with calcium carbonate ($CaCO_3$) nanocrystals.

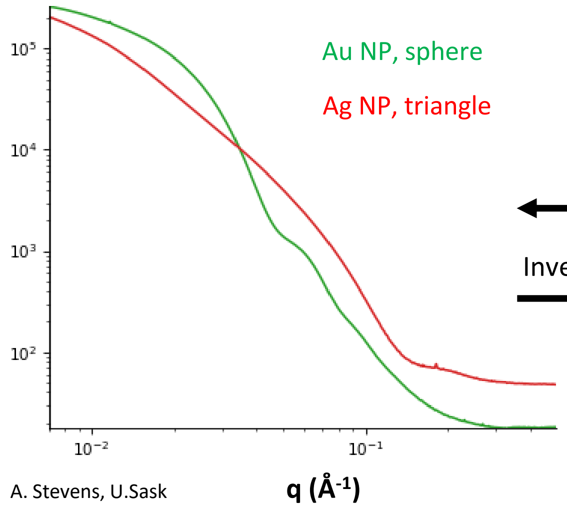
Use SAXS to gain a deeper understanding of the water-resistance mechanism of our manufactured bio-fibers.

% CaCO3	Rg (Å)	Porod Exp
0	111.0	4.1
1	110.5	4.1
3	107.5	4.0
10	106.0	4.1

- $CaCO_3$ is reducing Rg (fibers are compacting? shrinking? stiffening?)
- Porod exponent indicates smooth surfaces, not swollen
- Nano-chitin is likely tightly coiled in solution

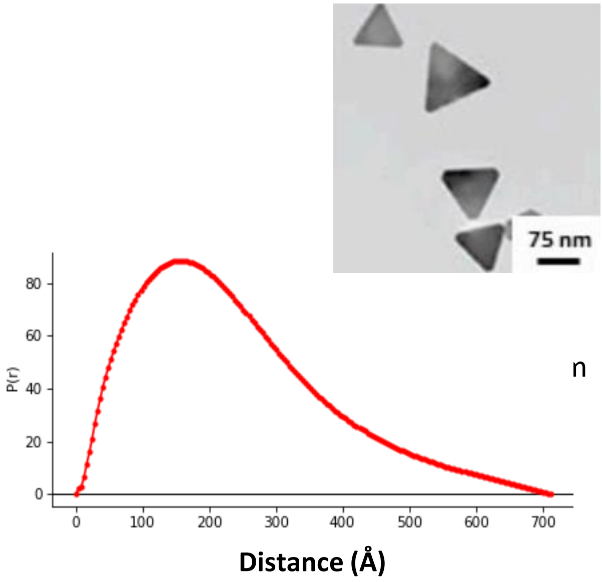
Canadian Light Source Centre canadien de rayonnement synchrotron

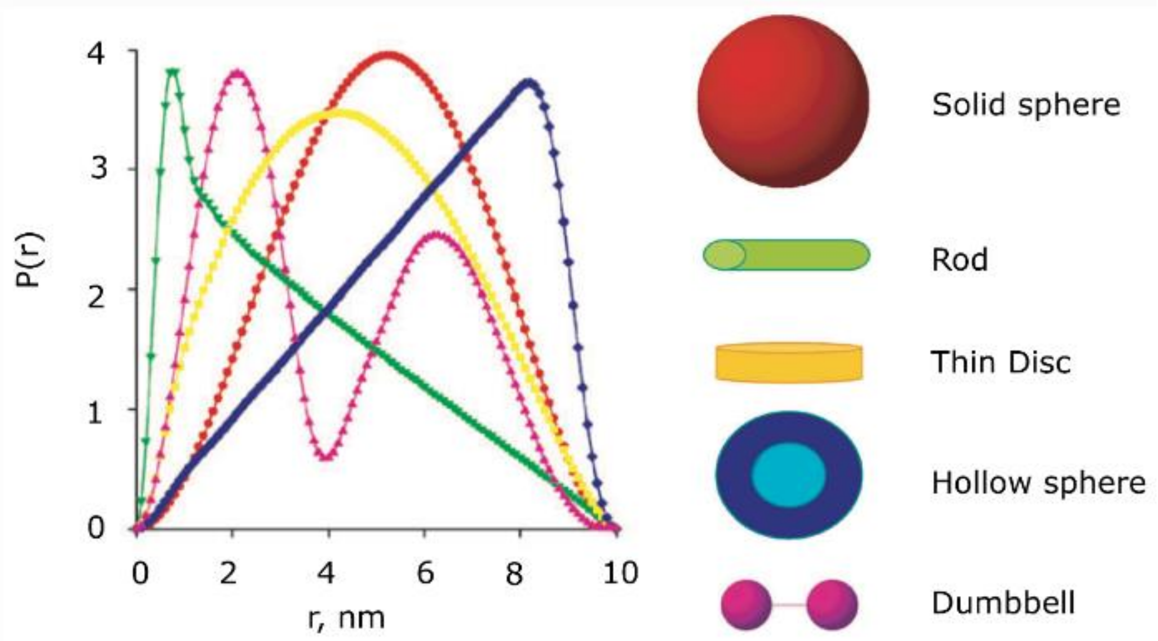
Shape information: Pair distance distribution function (PDDF)



FT

Inverse FT





D. Svergun, M.H.J. Koch, Rep. Prog. Phys. 66 1735 (2003)

Reciprocal space intensity

Real space distance frequency

Histogram of atom-atom distances within a single particle, weighted by respective electron densities

D_{max} – **Largest interatomic distance** in the scattering particle

Shape of the P(r) function is related to the **shape** of the particle, with low spatial resolution

q range required

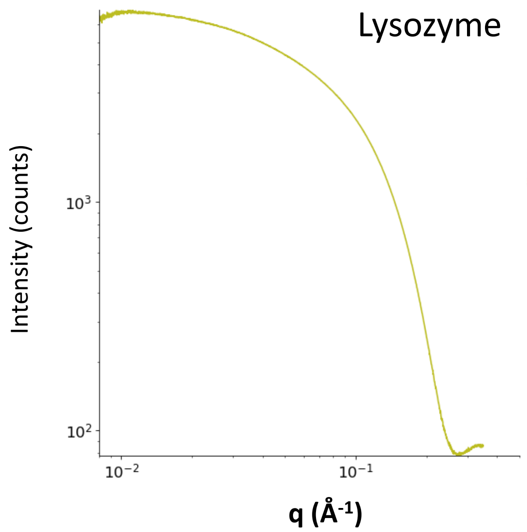
$q_{min} \leq \pi / D_{max}$ (π/0.005 Å^{-1} = 62 nm)

$q_{max} \geq 2\pi / D_{max}$

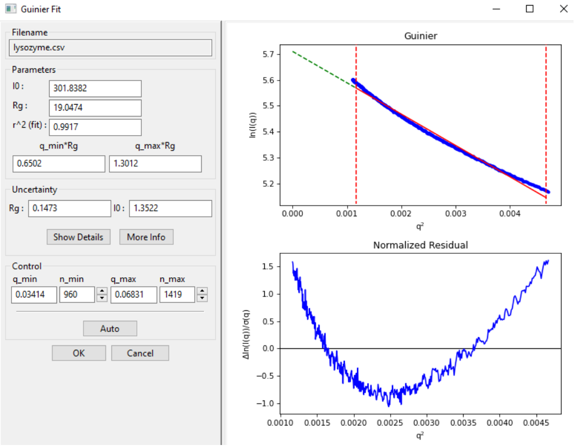
D. Putnam et al. Quart. Rev. Biophys. 40, 191-285 (2007)

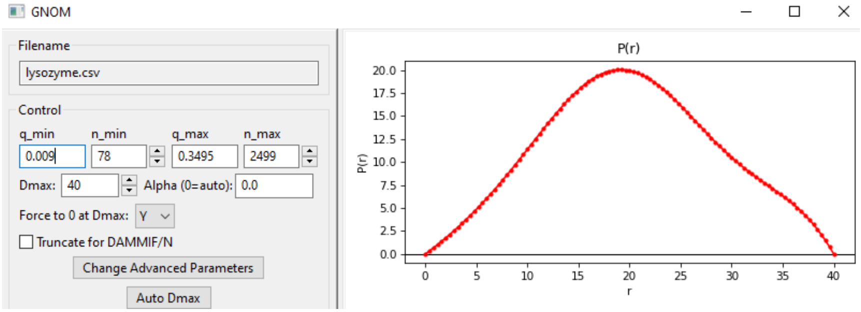
Canadian Light Source Centre canadien de rayonnement synchrotron

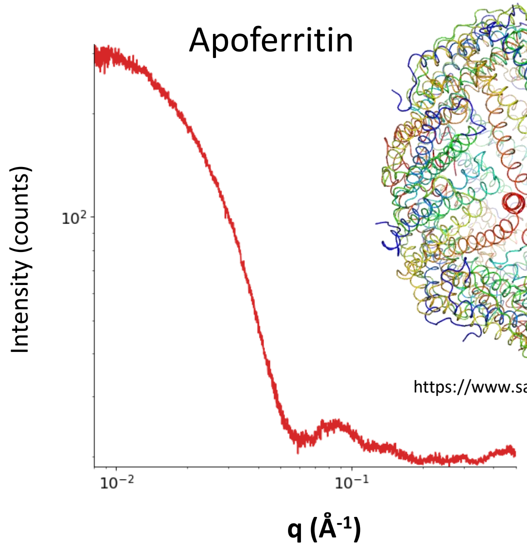
Proteins in solution

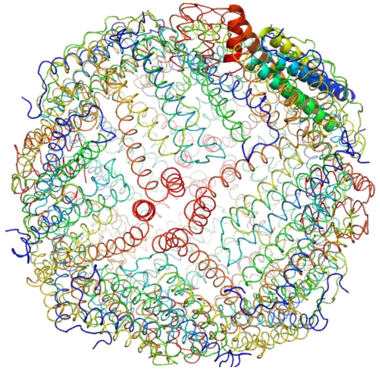


R_g: 1.9 nm



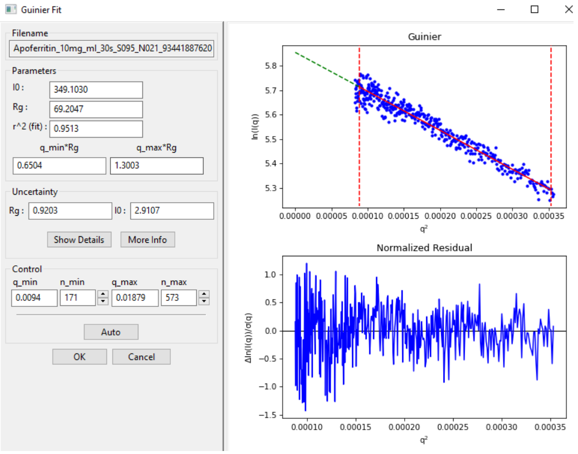


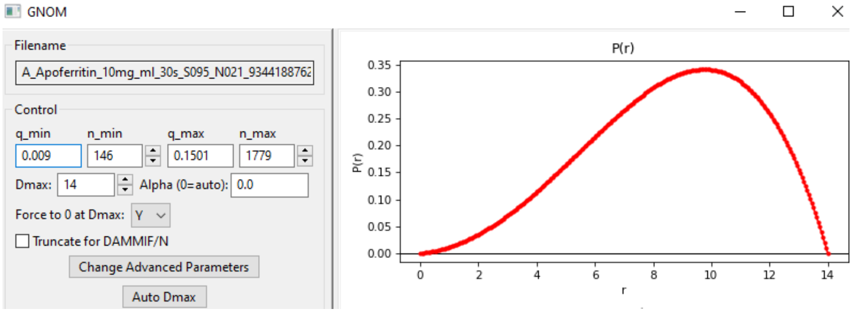


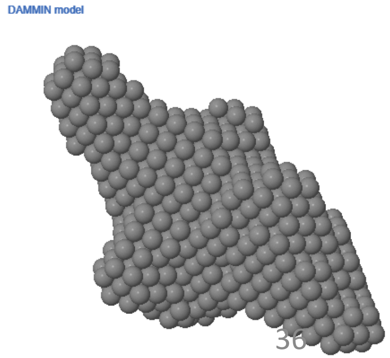


https://www.sasbdb.org/data/SASDCD8/

R_g: 6.9 nm







Low resolution protein structure

ATSAS package
DAMMIF/DAMMIN
GASBOR

Several dedicated Bio-SAXS beamlines

D. Svergun EMBL group example

Summary

The CLS has a SAXS endstation available… Call for General User Proposals opens July 22, closes August 19, 2026

Probe nano-scale dimensions and ordering (1 - 150 nm) with X-rays by measuring elastic scattering at small angles

Can learn about packing, particle size, and particle shape

Limited structural information, and data analysis can be ambiguous with numerous interpretations

Complementary information, that should be supported with supplementary techniques such as microscopy

Further reading

Basic SAXS concepts

H. Schnablegger, Y. Singh, “The SAXS Guide: Getting Acquainted With the Principles”, Anton Parr, Austria. (2017)

Making a good measurement

B.R. Pauw, “Everything SAXS: small-angle scattering pattern collection and correction” J. Phys.: Condens. Matter 25 (2013) 383201

Basic data work up

J.B. Hopkins, R.E. Gillilan, S. Skou
https://bioxtas-raw.readthedocs.io/en/latest/saxs_tutorial.html

BioSAXS, data workup, introduction to structure modelling

C.D. Putnam, M. Hammel, G.L. Hura, J.A. Tainer, “X-ray solution scattering (SAXS) combined with crystallography and computation: defining accurate macromolecular structures, conformations and assemblies in solution”
Quarterly Reviews of Biophysics 40, 3 (2007), pp. 191–285.

The Brockhouse Sector Team

Al Rahemtulla

Graham King

Narayan Appathurai

Beatriz Diaz Moreno
Beamline Responsible
Beatriz.Moreno@lightsource.ca

Karim Louca

Joel Reid

Stefan Kycia
Professor, U. Guelph
Beamteam Leader

Adam Leontowich
Adam.Leontowich@lightsource.ca

Hands on SAXS data analysis

Update CPDW19 tutorials here: https://drive.google.com/drive/folders/1x1noj2g9FmPB5CQIF7ISQoMC6g_W6Fn4?usp=sharing

Data reduction

GSAS-II

-Detector calibration
-Masking
-Subtract background
-Multi-image pixel mask search
-Integration

Data manipulation

BioXTAS RAW

-Merge
-Crop
-Convert q scale from Å-1 to nm-1

Data analysis

BioXTAS RAW

-Guinier
-PDDF

SASView

-Fitting to models
-Power law