

# SWING

beamline

## Biophysics

ORGANISMS



TISSUES



CELLS



ORGANELLES



COMPLEXES



PROTEINS



ATOMS



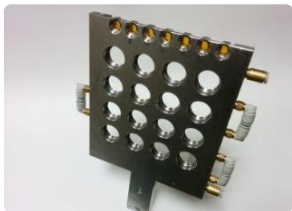
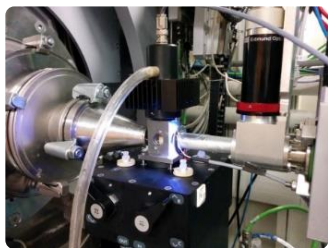
# SAMPLES

## TYPES

- Liquids, liquid crystals, lipids, (rheo)gels
- Colloids, micelles, liposomes
- Heterogeneous solutions
- Biological tissues (fibres, bones, tendons, muscles, hair)
- Bio-inspired materials

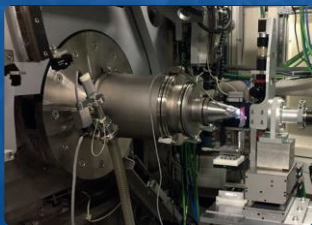
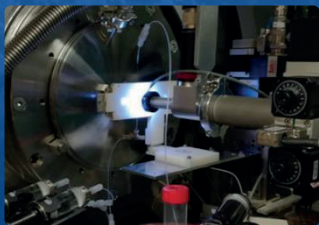
## ENVIRONMENTS

- Multi Capillaries Holder (-20 to 120 °C)
- Circulation capillary holder (10 to 60°C)
- Liquid autosampler (duty cycle: 4 min)
- Multiple Gels/Solids Holder (10 to 60°C)
- Biologic Stop Flow mixer SFM400
- Traction Cell (1 to 100 N, res: 0.05 N)
- Fluigent Microfluidic MFCS-EZ system
- Linkam Temperature Stage (-196 to 600 °C)
- Anton Paar Rheometer MCR 501
- Your own environment !



# TECHNIQUE

SWING is a beamline for Small-Angle X-ray Scattering, providing structural information from supramolecular assemblies (size, shape, distances, orientations), at a scale between nm and  $\mu\text{m}$ . Widely used in the field of Soft Condensed Matter, it usually needs a priori models for data interpretation.



## SAXS



Q-range : from  $5.10^{-4} \text{ \AA}^{-1}$  @ 6 keV  
to  $3.0 \text{ \AA}^{-1}$  @ 16 keV



Typical times for one image exposure :  
10 – 1000 ms.



Fast measurements down to 1.5 ms rate,  
in shutterless mode.



Downloadable graphical application  
for data reduction.



Typical size of one SAXS image:  
1 M / 4 M pixels

## $\mu$ -SAXS Cartography



Beam size (lateral spatial resolution):  
10 (V) x 20 (H)  $\mu\text{m}$



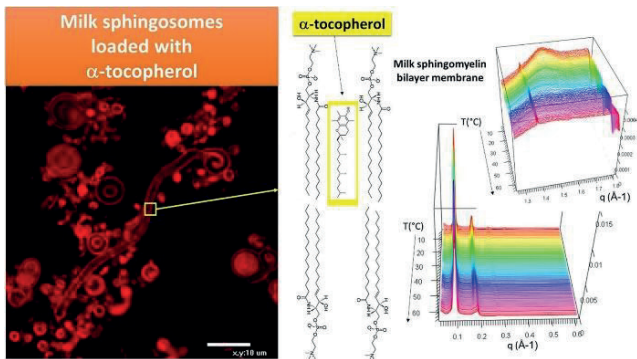
Continuous raster scan mode with  
no dead time.



Cartography data split into interconnected  
HDF5 2Gb files

# HIGHLIGHTS

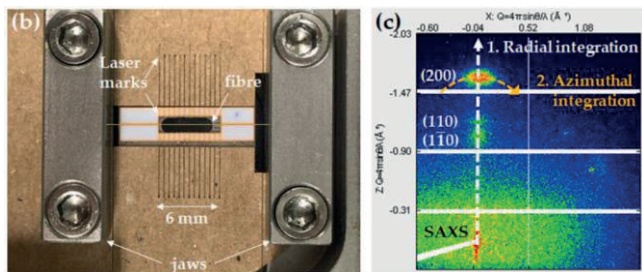
## Designing food-grade hydrocolloidal encapsulation systems.



Lopez, Christelle, et al., Food Research International (2022)

- Milk-sphingomyelin sphingosomes loaded with tocopherols prevent oxidation in aqueous foods containing polyunsaturated lipids such as oil-in-water emulsions.

## Expanding plant-based bio-composites for structural applications, especially using flax due to its high potential.

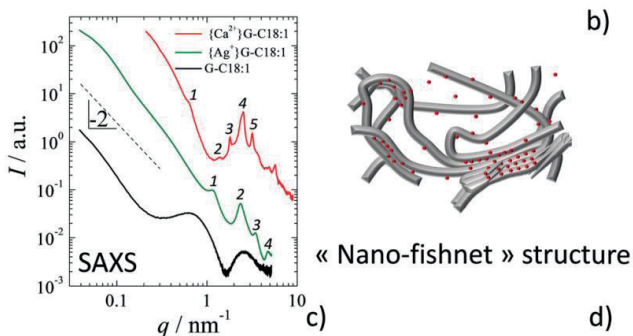


Emmanuelle Richely, Alain Bourmaud, Johnny Beaugrand et al., Composites Part C: Open Access 9 (2022)

- Contrasted initial microfibril angles between 4.7 and 7.4° depending on the fibre.
- Major influence of the cellulose microfibrils on the tensile response, with a non-linear decrease of the overall Young's modulus upon increasing microfibril angle.



**Hydrogels are able to retain a large amount of water content, which is of utmost importance for medicine and more generally for hygiene and medical product development.**



Alexandre Poirier, Niki Baccile, *et al.*, *Soft Matter* (2023)

- Strong stability of the hydrogel towards shear and temperature explained by its  $\beta$ -sheet-like structure.
- Unique self-assembly behaviour in the presence of  $Ca^{2+}$  or  $Ag^{+}$ , as phases from molecules with similar chemical structures are not affected by cations.

## REFERENCES

- Thureau, A., Roblin, P., Perez, J. "**BioSAXS on the SWING beamline at Synchrotron SOLEIL**" *Journal of Applied Crystallography*. (2021).
- Desjardins, K., Pomorski, M., Bizien, T., Thureau, A., Meneglier, C., Pérez, J. "**An active x-ray beamstop based on single crystal CVD diamond at beamline SWING**" *Review of Scientific Instruments*. (2021).



**More information  
on SWING web page**

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SOLEIL's Health and Well-being Scientific Section is composed of 30 scientific experts from different fields. Through collaborative and science-driven approaches, the Section offers the community a coherent portfolio of state-of-the-art techniques to serve scientific and societal health-related challenges.



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