

SOFT MATTER SYSTEMS INVESTIGATED BY SMALL-ANGLE X-RAY SCATTERING

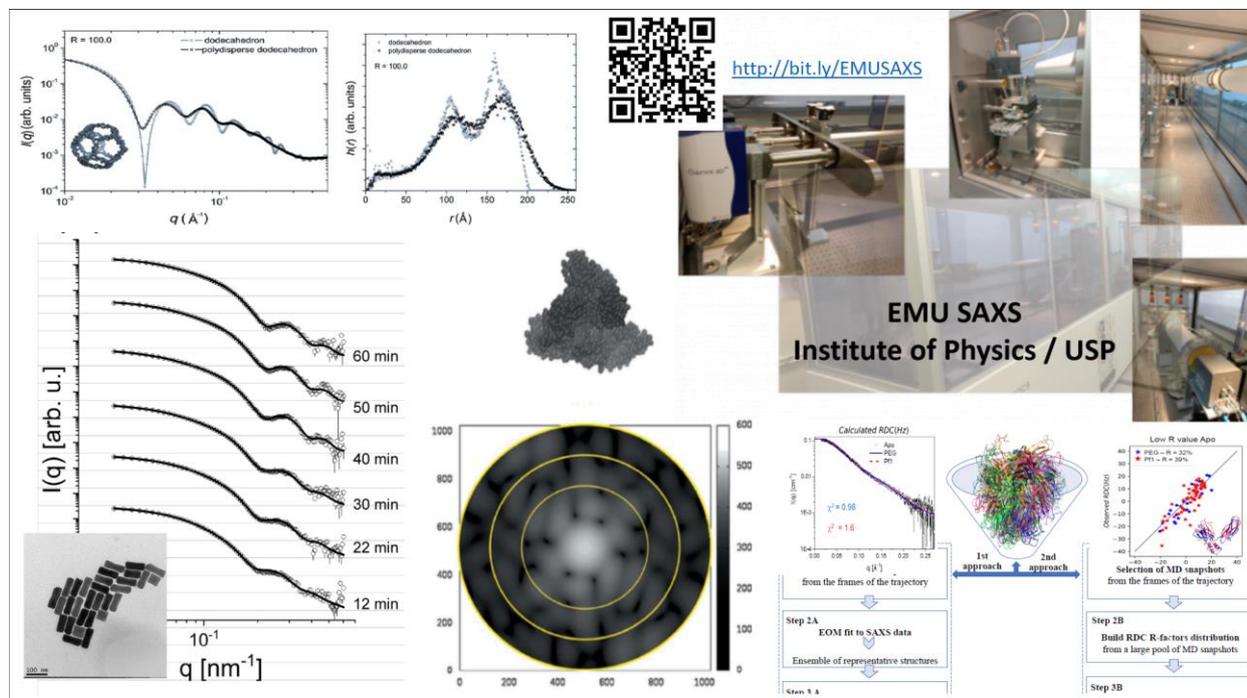
OLIVEIRA, Cristiano L. P.

Institute of Physics, University of São Paulo, Brazil

E-mail: crislpo@if.usp.br

Soft matter is a fascinating research field. In this topic one finds an enormous number of systems and products we consume and use in our everyday life. Food, washing products, plastics, liquid crystals are just few examples of such systems. One striking property of soft-matter is its ability of self-assembly in highly hierarchic structure. Surfactant systems, for example, in aqueous media can form different types of micelles or supramolecular arrangements, depending on the system characteristics (concentration, temperature, etc). The structural investigation of this type of system has to be performed in such a way that does not disturb its thermodynamic equilibrium. Scattering methods, in particular small-angle X-ray scattering (SAXS), are very suitable for these studies since it has a minimum interaction with the system, preserving the equilibrium. Even though the experimental data provides information in the so-called reciprocal space, requiring the use of specialized modeling and analysis methods, the information reflects a reasonable ensemble average, since the data results from the contribution of a very large number of scatterers.

At the Institute of Physics of University of São Paulo we recently opened a Multi-user Scattering Center composed of three laboratory based SAXS instruments, allowing the development of a large number of projects of our research group and also, giving support for users from Brazil and other countries. This center is allowing researchers to obtain high quality SAXS data, particularly during the period where the new Brazilian synchrotron, Sirius, has been finalized and will continue to be a useful place for the use of the SAXS/WAXS/USAXS techniques. In this talk several examples of the use of the SAXS methods for investigating soft matter systems, with the development of advanced modeling methods, will be shown. Advanced studies of lipid membranes, protein systems, nanoparticles, liquid crystals, human hair and several other examples are presented and discussed [1-11].



Keywords

Soft Matter, SAXS, modeling, proteins

References

1. Oliveira, C.L.P., et al. *J. Appl. Cryst.*, 2012. 45: p. 1278-1286.
2. Gerbelli, B.B. and C.L.P. Oliveira, *TT Bioan. Chem.*, 2022, Springer, Cham. p. 167-178.
3. Alves, C. and C.L.P. Oliveira, 2018, Intech. p. Ch. 1.
4. Alves, C., J.S. Pedersen, and C.L.P. Oliveira, *J. Appl. Cryst.*, 2017. 50: p. 840-850.
5. Alves, C., J.S. Pedersen, and C.L. P. Oliveira, *J. Appl. Cryst.*, 2014. 47: p. 84-94.
6. Degenhardt, M.F.D., et al. *Bioph. J.*, 2021. 120(17): p. 3664-3675.
7. Garcia, P. et al., *Int. Nano Letters*, 2021.
8. Rasmussen, M.K. et al. *Mic. Mes. Mat.*, 2021. 312.
9. Ruks, T., et al., *Acs Appl. Bio Mat.*, 2021. 4(1): p. 945-965.
10. Santos, O.R., et al., *J. Mol. Liq.*, 2021: p. 118097.
11. Lima, C., et al. *Eur. Phys. J.-Spec.Topics*, 2020. 229(17-18): p. 2825-2832.