

Simultaneous Extended Q-Range Small-Angle Neutron Scattering and in-situ Light Absorption Techniques for Soft-Mater and Biological Systems.

The understanding of soft and biological materials requires the global knowledge of their microstructural features from the elementary units at the nm scale up to larger complex aggregates, in the micrometer range. Such a wide length scale can be explored at the KWS-2 small-angle neutron (SANS) diffractometer of JCNS [1-3], which was optimized for structural investigations over a wide momentum transfer Q range, between $2 \times 10^{-4} \text{ \AA}^{-1}$ and 1.0 \AA^{-1} , by combining classical pinhole and focusing (with lenses) methods, while simultaneously providing high-neutron intensities with an adjustable resolution $-\Delta\lambda/\lambda$ between 2% and 20%, using a chopper and TOF data acquisition. Moreover, to support the SANS observations with additional information about the local molecular level structure and conformation the instrument was equipped with in-situ light absorption abilities. UV/Vis or Fourier transform IR spectroscopy can now be performed simultaneously with standard or time-resolved SANS. Finally, an in-situ size-exclusion chromatography (SEC) option is currently in development. In the near future, this will allow SANS characterization of unstable biological macromolecules which undergo aggregation over short times.

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[3] –J. E. Houston et al., J. Appl. Cryst. 51, 323 (2018).

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