

50 years of D11

A history of SANS
at the ILL



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Visualisation of morphological changes in Soft Matter Systems via SANS contrast variation at the D11

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The striking difference in the scattering length density of H and D offers a chance to vary or tune the neutron scattering contrast of selected components in complex systems while retaining the chemistry of the systems. Such contrast variation in turn provides unique opportunities for structural analysis in the field of Soft Matter not accessible to other scattering techniques like for instance to investigate the structure of particles in distinct matrices or to analyse the shape and distribution of a component or compartment within a particle. The present contribution reports on three typical examples of a successful application of the concept of contrast variation carried out with D-11. The first example presents a model analysis on aspects of cellular crowding via an investigation of the impact small colloidal particles at variable concentration exert on the size and shape of macromolecules in dilute solution. SANS demonstrated for the first time that small colloids induce a shrinking of the coil dimensions of macromolecules.¹ The second example presents an investigation of double hydrophilic block copolyelectrolytes forming micelles at high and low temperature. SANS could locate the two blocks within the micelles at either temperature and revealed full inversion of the micelles along the temperature variation.² The third example, establishing the most recent project, presents a study on mixed micelles formed from DTAB as a typical cationic surfactant and an anionic azo-dyestuff. SANS succeeded to locate the dyestuff within the co-assembly of the two components.

1. Kramer, T.; Schweins, R.; Huber, K. *Macromolecules* 2005, 38, 9783-9793
2. Carl, N.; Prevost, S.; Schweins, R.; Houston, J. E.; Morfin, I.; Huber, K. *Macromolecules* 2019, 52, 8759-8770

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