Probing Self-Assembly Processes in Soft Matter

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While scattering techniques are widely used to elucidate the multi-scale structure of soft matter, pathways of their self-assembly process are only beginning to be explored. Quantitative structural studies of the self-assembly process in the nanoscale and millisecond time range are now feasible thanks to the developments at the synchrotron sources [1]. This will be demonstrated by several examples such as the self-assembly of unilamellar vesicles, block copolymer micelles, etc. The primary goal of these time-resolved experiments is to gain better insight into the underlying dynamics and offer predictive capability of the process. Probing the structural kinetics in turn could provide a comprehensive understanding of the underlying nanostructure. This will be illustrated by examples involving the complexation of casein micelles from milk with plant tannins (EGCG), and adsorption of model proteins (BSA) on to spherical polyelectrolyte brushes. Finally, an overview of the proposed developments for time-resolved SAXS and related techniques within the ESRF upgrade program will be presented.

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[1] T. Narayanan, *Current Opinion in Colloid and Interface Science*, **14**, 409 (2009).