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Dynamics of the Self-assembly of Unilamellar Vesicles. T.M. Weiss¹, T. Narayanan¹, M. Gradzielski²,
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The intermediate stages in the formation of vesicles from of an equimolar mixture of anionic and zwitterionic surfactant micelles were probed with millisecond time resolution. The initial micellar solutions were mixed rapidly using a stopped-flow device and time-resolved small-angle X-ray scattering was used to monitor the structural changes. The original micelles transformed to disk-like mixed micelles within the mixing and transfer time (<4 ms). These disk-like micelles grew further by fusion during the first few hundred milliseconds after the mixing and then closed to form unilamellar vesicles within a second. The unilamellar vesicles evolved further by coalescence in time scales of minutes to a more polydisperse distribution of size. The millisecond time-resolution enabled us to identify different structural intermediates and their dynamics in this multi-step self assembly process.