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Self-assembly of Colloids in a Suspended Droplet: In-situ small-angle X-ray scattering JITENDRA BAHADUR, Biology and Soft Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA , DEBASIS SEN, S. MAZUMDER, Solid State Physics Division, Bhabha Atomic Research Centre, Mumbai, India, G. SANTORO, S. YU, S.V. ROTH, Photon Science, Deutsches Elektronen-Synchrotron (DESY), Notkestr. 85 D-22607, Hamburg, Germany, Y.B. MELNICHENKO, Biology and Soft Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA — An in-situ scanning SAXS experiments have been performed to probe the drying of a single suspended colloidal droplet. It has been demonstrated that shell formation can be predicted just by measuring the temporal evolution of the spatial transmission profile. The shrinkage of the droplet stops after formation of a shell. The shell thickness and droplet radius have been estimated by fitting the transmission profiles using analytical expressions. It is revealed that the evolution of volume fraction of colloids is linear during the initial stage of drying and follows a sigmoidal growth behavior at later stages. Further, the interaction between colloidal particles at different drying stages has been investigated. We provide experimental proofs of a transition from repulsive interaction between colloids into a capillary driven short range attraction for shell formation during drying. The present work demonstrates that in-situ SAXS is a very valuable technique for monitoring the dynamic processes of colloidal self-assembly and provides the opportunity to probe the drying of complex fluids without the interference from a substrate.

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