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Dynamics during a transient gelation process studied by XPCS
ANDREI FLUERASU, European Synchrotron Radiation Facility, Grenoble, ABDELLATIF MOUSSAID, ESRF, ANDREW SCHOFIELD, Physics Department, Univ. Edinburgh, ANDERS MADSEN, ESRF — Photon correlation spectroscopy with partially coherent X-ray beams (XPCS) available at third generation synchrotron sources is an experimental technique that allows the direct measurement of the low frequency microstructural dynamics that are often present in a large class of soft-condensed matter systems. In many such systems and in particular in concentrated disordered systems, at least two distinct relaxation mechanisms can usually be found. The fast(er) ones correspond to the "trapped" motion of individual particles or aggregates in "cages" created by other particles/aggregates. The slow relaxation modes correspond to the structural re-arrangements of the "cages". In this work we report the XPCS study of the structural dynamics associated with the slow collapse of transient gels consisting of mixtures of sterically-stablised polymethylmethacrylate (PMMA) particles and random-coil polystyrene (PS) dispersed in cis-decalin. The intermediate scattering functions change during the process from stretched to compressed exponential decays indicating a jamming of the system in the full aging regime. A complex aging behavior towards the final collapse of the gel is observed and we propose that large scale network deformations trigger an un-jamming process leading to the collapse.

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