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Ultrasmall-angle X-ray scattering photon correlation spectroscopy over extended length and time scales ANDREW ALLEN, FAN ZHANG, LYLE LEVINE, NIST, JAN ILAVSKY, GABRIELLE LONG, Argonne National Laboratory — X-ray Photon Correlation Spectroscopy (XPCS) is an emerging technique offering unprecedented sensitivity to dynamics of structural changes in materials. Existing XPCS facilities are limited to microstructure length scales less than 50 nm, eliminating large classes of important materials. Recently, the scale range has been extended dramatically by combining XPCS speckle measurements with ultrasmall-angle scattering (USAXS) studies at the Advanced Photon Source. While USAXS characterizes microstructures from nanometer to micrometer length scales, a small entrance slit allows the undulator X-ray beam coherence to be exploited to give synergistic XPCS measurements of microstructure dynamics. At the larger length scales, the correspondingly slower dynamics are well matched to USAXS scan times. Progress will be discussed for composites in biomedical applications.

Andrew Allen
NIST

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