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Strain Analysis in 2D and 3D X-ray Microscopy[1] J.Z. TISCHLER, B.C. LARSON, ORNL, WENJUN LIU, ANL, LYLE LEVINE, NIST — Spatially resolved strain distributions on the submicron length scale are important for materials problems such as deformation and phase separation, and in heterogeneous systems in general. High-energy 3DXRD techniques have been developed by RISO with a few micron 3D resolution for lightly deformed materials. However, submicron 3D spatial distributions of local strain in heavily deformed materials are often required, such as in for multiscale materials modeling. We have developed a scanning-monochromatic x-ray microbeam technique on sector-34 of the Advanced Photon Source to measure the Q-distribution from submicron volume elements in lightly and heavily deformed materials and in single, polycrystalline, or composite materials. By sorting the intensity from every pixel in an area detector during nested energy and differentialaperture depth scans, Q-distributions are obtained for every spatially resolved volume element. We will present measurement examples and discuss the range of applications.

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