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# X-RAY MICROBEAM TECHNIQUES FOR STRUCTURAL EVOLUTION AND STRESS/STRAIN MEASUREMENTS

B. C. Larson
Condensed Matter Sciences Division
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, Tennessee 37831-6030

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B. C. Larson
Condensed Matter Sciences Division
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The local polycrystalline microstructure and differential thermal expansion induced plastic and elastic strain are known to impact the integrity and reliability of metal interconnects. Moreover, these importance of these effects is increased as the length scales of devices decreases. The availability of 3rd generation synchrotron x-ray sources and advances in achromatic focusing optics have made it possible to obtain submicron (~0.5 micron) diameter polychromatic microbeams; beams a small as 70 nm have been demonstrated. The development of techniques for automatic crystallographic indexing and analysis of Laue diffraction patterns has made it possible to obtain, nondestructively, the local lattice structure, orientation, grain-morphology, plastic deformation, and elastic strain tensors in thin films and interconnects with submicron spatial resolution. The x-ray microbeam measurement technique will be discussed and applications to spatially resolved measurements in metal interconnects will be presented.