Macroscopic Metrology of Nanoscale Materials

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The length scales of modern materials continue to shrink into the subnanometer scale requiring modern metrology methods to keep pace. X-ray diffraction, with its intrinsic sub-angstrom sensitivity and non-destructive nature, is primed and ready for the next generation of materials challenges. By utilizing innovative source and optic technologies with efficient multi-dimension detection technologies, questions previously limited to synchrotron analysis can now be addressed in the lab. Methods for measuring ultrathin epitaxial layers will be presented including both qualitative and quantitative analysis. In particular, examples of correlated electron multiferroic perovskite epitaxial thin films will be shown.