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**X-Ray Microdiffraction Studies of Epitaxial Growth of Oxide Films on Textured Metal Substrates\***

J. D. BUDAI, W. YANG, B. C. LARSON, J.Z. TISCHLER, G.E. ICE, K.-S. CHUNG, *Oak Ridge National Laboratory*; D.P. NORTON, *Univ. of Florida*; W.P. LOWE, *Howard Univ.* We have used newly developed white x-ray microdiffraction techniques to study the epitaxial growth of oxide films on rolling-textured nickel substrates (for superconducting applications). Polychromatic x-rays were focused to <1mm diameter using elliptical Kirkpatrick-Baez mirrors at the Advanced Photon Source using the MHATT-CAT and UNICAT beamlines. Analysis of CCD Laue patterns yields detailed real-space maps of the local crystallographic orientation and the strain tensor simultaneously from each layer of the multilayer samples. Crystallographic tilting of the heteroepitaxial films as a function of the local miscut of individual substrate grains and as a function of the growth temperature has been measured and modeled. Orientation measurements adjacent to substrate grain boundaries show no film tilting due to substrate grooving. Temperature-dependent strain measurements show that the microstrain, like the macrostrain, is biaxial and is consistent with thermal contraction.

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