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Biaxial Texture Evolution in Ion-Beam Assisted Deposition of MgO VLADIMIR MATIAS, MPA-STC, Los Alamos National Laboratory — We examine the evolution of biaxial crystalline texture during ion-beam assisted deposition (IBAD) of MgO using reflection high-energy electron diffraction, *in situ* ion scattering, and x-ray diffraction. The IBAD-MgO templates on metal tape are used for second generation high-temperature superconducting wire, also known as coated conductors. For MgO and some other materials with a rock salt crystalline structure, IBAD texturing can be achieved within the first few nanometers of deposited material. We find that the texture development is very sensitive to the nucleation surface conditions, both chemical species and surface morphology. In the best cases an in-plane texture of 2 degrees and an out-of-plane texture of 1 degree are attainable in a homoepitaxial MgO layer. We are utilizing a methodology of presenting data in terms of IBAD texture contour plots where we collect data as a function of ion-to-molecule ratios and film thickness. The striking conclusion from the data is that the texture development for different ion-to-molecule ratios can be scaled with the cumulative ion damage normalized to deposited MgO material. We discuss the results in terms of possible mechanisms for IBAD-MgO biaxial texturing and relationship to other IBAD texturing processes. This work is supported by the Department of Energy Office of Electricity Delivery & Energy Reliability.

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