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Critical current density variations with increasing thickness in $YBa_2Cu_3O_{7-x}$+ $BaSnO_3$ (BSO) films CHAKRAPANI VARANASI, University of Dayton Research Institute (UDRI), JACK BURKE, LYLE BRUNKE, UDRI, HAIYAN WANG, Texas A&M, PAUL BARNES, Air Force Research Labs, UDRI TEAM, TEXAS A&M COLLABORATION, AFRL TEAM — To increase the engineering critical current density (J_e) of $YBa_2Cu_3O_{7-x}$ (YBCO) films, it is of great importance to grow thicker films with high critical current density (J_c). However, it has been shown that in pulsed laser ablated (PLD) YBCO films, as the thickness is increased beyond 1 μm, the J_c of the films decreases. Earlier work by this group showed that YBCO+$BaSnO_3$ (BSO) films of $\sim$ 300 nm thickness can be grown with more than an order of magnitude increase in the J_c in applied magnetic fields using a dual phase sector PLD target approach. In the present work a systematic study of J_c dependence on the thickness of YBCO+BSO thick films was undertaken by growing different films with thicknesses ranging from 300 nm to 4 μm. The J_c of these films was measured using a magnetometer indicated that high J_c at high fields can be maintained even in thicker films. The cross-sectional TEM analyses of the thick films showed that the BSO nanocolumns grow through out the entire thickness of the samples. Microstructural details and the superconducting properties of thick YBCO+BSO films will be presented.

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