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## M2Po2B-04 [35]: Magnetization creep and decay of YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> thin films with columnar Y<sub>2</sub>BaCuO<sub>5</sub> and BaZrO<sub>3</sub> pinning center additions

*Tuesday, July 23, 2019 1:30 PM (2 hours)*

Maximizing critical current density ( $J_c$ ) and minimizing flux creep in high temperature superconductors (HTS) is critical for their inclusion in accelerator magnets where both high magnitude and high stability magnetic fields are required. In YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> (YBCO) thin films, critical current density can be enhanced by either the addition of many shallow pinning centers or the addition of fewer, deeper pins. In contrast, flux creep is better managed by the addition of deep pins. Pulsed laser deposition (PLD) was utilized to fabricate YBCO thin films on SrTiO<sub>3</sub> (STO) substrates with two different, non-reacting, and insulating phase additions: BaZrO<sub>3</sub> (BZO) and Y<sub>2</sub>BaCuO<sub>5</sub> (Y<sub>2</sub>11). Targets utilized in the PLD process consisted of YBCO doped with 2 vol. % BZO, and YBCO doped with 0, 5, 10, and 15 vol. % Y<sub>2</sub>11. XRD and TEM characterization was performed. Magnetic  $J_c$  ( $B, T, \mu_0$ ) properties were determined. Additionally, the magnetic relaxation of the samples was measured at fields from 0-8 T and at temperatures of 4.2 to 77 K. The results of these measurements were used to generate  $U(J)$  vs.  $J$  curves for each sample; fits were performed to extract an intrinsic pinning potential ( $U_0$ ). These data were compared with high resolution XRD and TEM data on these uniquely hetero-structured YBCO films to elucidate structure-property relationships.

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