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Optimizing Flux Pinning of YBCO Thin Films with BZO + Y2O3 Double-Mixed Phase Additions

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Adding nanophase defects to YBa2Cu3O7-z (YBCO) superconductor thin films is well-known to enhance flux pinning; resulting in an increase in current density (Jc). While many previous studies focused on single phase additions, the addition of several phases simultaneously shows promise in improving current density by combining different pinning mechanisms. This paper encompasses the effect of the addition of insulating, nonreactive phases of barium zirconium oxide (BZO) and yttrium oxide Y2O3. Processing parameters varied the target composition volume percent of BZO from 2 - 6 vol. %, while maintaining 3 vol. % Y2O3, and the remaining vol. % YBCO. Pulsed laser deposition produced thin films on LaAlO3 (LAO) and SrTiO3 (STO) substrates at various deposition temperatures. Comparison of strong and weak flux pinning mechanisms, current densities, critical temperatures, and microstructures of the resulting films will be presented.

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