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Deposition temperature dependence of YBCO transport properties JIE WANG, J.H. KWON, J. YOON, H. WANG, Texas A&M University, T.J. HAUGAN, F.J. BACA, N.A. PIERCE, P.N. BARNES, Air Force Research Laboratory — In this paper, we report a strong correlation between the stacking fault (SF) density and the critical current density of YBa2Cu3O7-δ(YBCO) thin films in an applied field (Jcin-field). High quality superconducting YBCO thin films (thickness $\sim$300 - 350 nm) were deposited on SrTiO3 (STO) and LaAlO3 (LAO) substrates using a pulse laser deposition (PLD) technique. We found that theJcin-field increases as the deposition temperature increases (775°C - 825°C) for the samples grown on both STO and LAO substrates. Detailed microstructural studies including cross-section transmission electron microscopy (TEM) and high resolution TEM were conducted for all the films deposited on STO substrates. The YBCO SF density increases from $\sim$ 4.0x105/cm to $\sim$1.2x106/cm as the deposition temperature increases from 775°C to 825°C. An interesting linear relation is observed between the SF density and the Jcin-field value, which suggests that the YBCO SF density plays an important role in the YBCO in-field transport performance.

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