

# Superconductive Properties of $\text{Sm}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$ Films

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The transport properties of superconductive  $\text{Sm}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$  (SBCO) films were investigated. The films were grown on various substrates; the bi-axially textured Ni tapes with  $\text{CeO}_2/\text{YSZ}/\text{CeO}_2$  buffer layers, the tilted crystalline YSZ substrates with  $\text{CeO}_2$  buffer layers, and the bi-crystalline  $\text{SrTiO}_3$  substrates. The windows of substrate temperature for the c-axis normal growths in 5mTorr of oxygen pressure were much wider than those of YBCO films. The zero field critical currents ( $J_c$ ) were  $\sim 6$  times smaller than those of YBCO films. The anisotropy of  $J_c$ 's on the YSZ substrates, whose crystalline orientations were tilted with respect to the surface by  $0^\circ, 15^\circ, 30^\circ, 35^\circ, 45^\circ$ , was smaller than YBCO films. The inter-granular  $J_c$ 's for the bi-crystalline  $\text{SrTiO}_3$  substrates, whose mis-orientation angles were  $30^\circ$  and  $45^\circ$ , were much larger than those of YBCO films under various fields.

keywords :  $\text{Sm}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$ , films, critical currents, grain boundary