

## Effect of Lowering the Oxygen Partial Pressure on a $J_c$ Enhancement of Ce-doped YBCO Films Prepared by MOCVD

Y. H. Kim<sup>a,\*</sup>, B.-H. Jun<sup>b</sup>, C.-J. Kim<sup>b</sup>, T. H. Sung<sup>c</sup>, Y. H. Han<sup>c</sup>, S. C. Han<sup>c</sup>, K. S. No<sup>a</sup>

<sup>a</sup> Korea Advanced Institute of Science and Technology, Daejeon, Korea

<sup>b</sup> Korea Atomic Energy Research Institute, Daejeon, Korea

<sup>c</sup> Korea Electric Power Research Institute, Daejeon, Korea

Since the oxygen partial pressure is important parameter for the *in-situ* deposition of pure  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  (YBCO) films, many researchers have attempted to investigate the influence of the oxygen partial pressure on a critical current density ( $J_c$ ) enhancement of the films. By lowering the oxygen partial pressure an enhanced c-axis orientation and  $J_c$  of the films have been reported. In this work, we investigated whether a Ce-doped YBCO film showed an improved crystallinity and  $J_c$  value by lowering the oxygen partial pressure. Effect of the oxygen partial pressure was examined from the viewpoint of the ordering along the c-axis and the grain growth. Ce-doped YBCO films were fabricated on a  $\text{SrTiO}_3$  (STO) single crystal at the oxygen partial pressures of 10.0 Torr, 5.0 Torr, and 2.5 Torr using a metal organic chemical vapor deposition (MOCVD) method. A single liquid source ( $\text{Y}(\text{tmhd})_3 : \text{Ba}(\text{tmhd})_2 : \text{Cu}(\text{tmhd})_2 = 1 : 2.2 : 3.1$ ) with various amounts of  $\text{Ce}(\text{tmhd})_4$  (up to 10 wt%) was used as a precursor. From the texture analysis performed by X-ray diffraction (XRD), the degree of crystallinity of the films was increased and the  $J_c$  of the films was improved as the oxygen partial pressure was decreased. The highest  $J_c$  of 1.66 MA/cm<sup>2</sup> at 77K and a self-field was obtained on the film at oxygen partial pressure of 2.5 Torr.

Keywords : YBCO, MOCVD, oxygen partial pressure, Ce doping