

# Effect of Deposition Parameters on the Critical Current of $c$ -axis Oriented $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Films in Metal Organic Chemical Vapor Deposition Process

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The  $c$ -axis oriented  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  (YBCO) films were prepared by metal organic chemical vapor deposition (MOCVD) method. Single liquid sources with composition of Y:Ba:Cu = 1:2.1:2.9 and various buffered metal substrates such as IBAD ( $\text{CeO}_2/\text{YSZ}/\text{SUS}$ ), RABiTS ( $\text{CeO}_2/\text{YSZ}/\text{Y}_2\text{O}_3/\text{Ni-3\%W}$  and  $\text{CeO}_2/\text{YSZ}/\text{CeO}_2/\text{Ni}$ ) templates were used. To understand the deposition nature of YBCO films, processing parameters such as oxygen partial pressure, deposition temperature, feeding rate were changed. It was found that there are two possible ways of increasing critical currents; one is to lower the deposition temperature and the other is to reduce the rate of source supply. Both controls led to formation of the dense structure with  $c$ -axis orientation. The YBCO film with high critical current was obtained at the deposition temperature of  $730^\circ\text{C}$  and oxygen partial pressure of 3.33 Torr. At 77K, the critical currents of 36.0 A/cm-width and 34.8 A/cm-width were achieved for buffered IBAD and buffered Ni-3%W substrates, respectively.

keywords :  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  film, MOCVD, critical current, coated conductor

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