

Effect of Film Thickness on Critical Current of the YBCO Films Deposited by Cold-wall Type MOCVD Method

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YBa₂Cu₃O_{7-x} (YBCO) films were deposited on MgO (100) and SrTiO₃ (100) single crystal substrates by cold-wall type MOCVD method using continuous source supplying system. Under the deposition temperature of 740~760 °C and the oxygen partial pressure of 2.63~3.91 torr, c-axis oriented YBCO films were obtained. The critical temperature (T_c) of the YBCO films deposited on SrTiO₃ (100) single crystal substrate was 83~84 K. When YBCO film deposited on SrTiO₃ (100) substrate for 30 min, the film thickness was of 0.6 μm and the critical current (I_c) and critical current density (J_c) were 49 A/cm-width and 0.82 MA/cm², respectively. As the deposition time increased to 50 min, the film thickness and I_c increased to 1.8 μm and 84.4 A/cm-width, but J_c decreased to 0.53 MA/cm². The degradation of J_c with increasing film thickness is attributed to the formation of the a-axis oriented grains and misoriented grains from the c-axis grain.

keywords : YBa₂Cu₃O_{7-x} (YBCO) films, cold-wall type MOCVD method, critical temperature (T_c), critical current (I_c), critical current density (J_c)

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