Effects of Oxygen Partial Pressure on the Superconducting Properties of YBCO Film Prepared by Spray Pyrolysis Method

Suk-Kwan Hong, Jae-Geun Kim, Ji-Hyun Ahn, byeong-joo kim,
Hee-Gyoun Lee, Gye-Won Hong*
Department of Advanced Materials Engineering, Korea Polytechnic University,Korea

YBCO film has been successfully prepared on $LaAlO_3$ (100) single crystal substrate by spray pyrolysis method using nitrate precursor solution. The cation ratio of precursor solution was Y: Ba: Cu = 1:2.65:4.5 and 1:2.65:3.0. Films were deposited at the pressure of 10 Torr and the deposition temperature was 740℃. Substrate was transported continuously with a speed ranging from 0.5 cm/min to 0.6 cm/min. Oxygen partial pressure was controlled between 1 Torr and 5 Torr. Highly textured YBCO films were formed at the oxygen partial pressure lower than 3 Torr whereas poor-textured films were developed at higher oxygen partial pressure over 4 Torr. Texture and microstructure were also affected by the composition of precursor solution. High J_c over 1 MA/cm^2 was obtained for the film prepared at a substrate temperature of 740℃ and an oxygen partial pressure of 3 Torr.

Keywords: spray pyrolysis, nitrate precursor, YBCO, J_c

Acknowledgement
These researches were supported by contract R-2004-0-194 from Electric Power Industry Technology Evaluation & Planning.