

Deposition of Epitaxial YBCO Films on LaAlO₃(100) Substrate by Spray Pyrolysis Method

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YBa₂Cu₃O_y superconducting films were prepared on LaAlO₃ (100) single crystal substrate by spray pyrolysis method. The precursor solution was prepared by dissolving nitrate powders in de-ionized water. Both of ultrasonic and concentric nebulizers were used in order to generate fine droplets of precursor solution. In case of ultrasonic nebulizer, films showed rough and porous surface morphology, while smooth and dense films were obtained for concentric nebulizer. c-axis oriented films were obtained at deposition temperature of 750~850 °C and working pressure of 100 Torr. Oxygen partial pressure took an important role for the phase formation of YBa₂Cu₃O_y as well as for second phases such as BaCuO₂, CuO, and Y₂BaCuO₅. At relatively lower oxygen partial pressure, YBCO films with second phases of BaCuO₂ and CuO were formed, while YBCO films with Y₂BaCuO₅ phase were deposited at higher oxygen partial pressure. A transport J_c value of 0.43 MA/cm² at 77 K and self field was achieved on LaAlO₃ (100) single crystal substrate.

keywords : spray pyrolysis, YBCO, nebulizer, critical current density (J_c), oxygen partial pressure

Acknowledgement

This research (R-2004-0-194) was supported by a grant from Ministry of Commerce, Industry and Energy (MOCIE), Republic of Korea.