

## The Effect of Substrate Temperature on Superconducting Properties of YBCO Films Prepared by Spray Pyrolysis Method using Metal Nitrate Precursors

Jae-Geun Kim, Suk-Kwan Hong, Seok-Koo Yu, Han-Woo Cho, Byung-Joo Kim,  
Ji-Hyun Ahn, Gye-Won Hong and Hee-Gyoun Lee \*

*Korea Polytechnic University, 2121 Jungwang-dong, Siheung-si, Kyunggi-do, Korea*

YBCO films have been synthesized using a spray pyrolysis method. We used nitrates of Y, Ba, Cu as precursors. Deposition was made on LaAlO<sub>3</sub> (100) single crystal substrate by spraying the mist of aqueous precursor solution generated by a concentric nozzle. The distance between concentric nozzle and substrate was 15 cm. C-axis oriented films were obtained at deposition temperature of 740~800 °C and working pressure of 20 Torr. Oxygen partial pressure was 3 Torr and substrate was transported with the speed ranging from 0.23 cm/min to 0.7 cm/min by reel to reel. Scanning electron microscope (SEM) and X-ray diffraction (XRD) observation revealed that films are smooth and highly textured with (00l) planes parallel to substrate. Highest critical current density (J<sub>c</sub>) was 1.38 MA/cm<sup>2</sup> at 77K and self-field for the film with a thickness of 0.5 μm prepared at a substrate temperature of 780 °C and PO<sub>2</sub> =3 Torr. The effect of temperature on the microstructure and YBCO phase formation will be discussed.

Keywords: moving substrate, spray pyrolysis, nitrate precursor, YBCO, J<sub>c</sub>

### *Acknowledgement*

This study was partly supported by the grant from Energy and Electric Power Education Center program and funded by Ministry of Commerce, Industry and Energy(MOCIE), Republic of Korea.