

A Study on the Humidity Effects of YBCO Film by TFA-MOD Process

Seok Hern Jang^{*,a}, Jun Hyung Lim^a, Kyung Min Yoon^a, Seung Yi Lee^a, Kyu Tae Kim^a,
Chang-min Lee^a, Jinho Joo^a, Hee-Gyoun Lee^b, Gye-Won Hong^b

^a School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Korea

^b The department of Electronic Engineering, Korea Polytechnic University, Siheung, Korea

We fabricated $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (YBCO) films on (001) LaAlO_3 substrates prepared by metal organic deposition (MOD) method using trifluoroacetate (TFA) solution and evaluated the effects of the humidity on the microstructure, phase purity, and critical properties. The films calcined at 430°C were fired at 775°C at 0%, 4.2%, 12.1%, and 20.0% humidified Ar gas mixed with 0.1% O_2 .

We observed that the amount of BaF_2 phase was effectively reduced and that a sharp and strong biaxial texture formed under a humidified atmosphere, leading to increased critical properties. For the films fired at 0% humidity, the T_C and I_C were undetectably small. When the humidity was increased to 4.2%, the corresponding T_C (onset) and I_C were increased to 90.5 K and 8 A/cm-width, respectively. For the films at the humidity range of 12.1-20.0%, the I_C was found to be 35 A/cm-width. According to the results of the XRD, pole-figure, and SEM, these improved critical properties are probably attributed to the formation of a purer YBCO phase, larger grain size, and stronger c-axis orientation.

Keywords : Critical current, Humidity, Pole-figure, TFA-MOD process, YBCO

Acknowledgment

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