

Sub-atmospheric Pressure Annealing of YBCO Films using F-free Y & Cu Precursor Solution

Yoonsuk Cho^a, Ryong Lee^a, Eunok Heo^a, Young-Kuk Kim^a, Jaimoo Yoo^a,
Kookchae Chung^a, Xiolin Wang^b, ShiXue DOU^b

^a*Korea Institute of Materials Science (KIMS), Kyungnam, Changwon, Korea*

^b*Institute of Superconducting and Electronic Materials (ISEM), Australia*

Influence of the process conditions in sub-atmospheric pressure annealing on $\text{YBa}_2\text{Cu}_3\text{O}_{7-y}$ (YBCO) film growth has been investigated to enhance the growth rate. YBCO films have been fabricated on single crystalline substrate by metal-organic deposition using F-free Y & Cu precursor solution. Suitable processing speed was searched by applying R2R annealing processing system working at total pressure of 100Torr and, it was observed that higher YBCO growth rate was achieved about 2.5 times as fast as that under the atmospheric fabrication conditions maintaining high critical current density (J_c). The fraction of a/b-axis oriented grains was strongly dependent on processing conditions compared with those formed by atmospheric pressure annealing. The formation of a/b-axis grains was successfully suppressed by controlling gas flow rate, water partial pressure, and substrates, etc. In this study, YBCO films with $J_c \sim 4 \text{MA/cm}^2$ was successfully fabricated after sub-atmospheric annealing at optimized processing conditions.

keywords : YBCO, MOD, Sub-atmospheric pressure annealing, a/b-axis grain, critical current density