

Ex-Situ Conversion of SmBCO Films on the IBAD-MgO Substrate

J. W. Lee^a, K. P. Ko^a, H. K. Kim^b, S. H. Moon^b, S. S. Oh^c, and S. I. Yoo^a

^a Department of Materials Science & Engineering, Seoul National University, Seoul, Korea

^b Superconductor, Nano & Advanced Materials Corporation, Anyang, Korea

^c Superconducting Material Research Group, Korea Electrotechnology Research Institute, Changwon, Kyungnam, Korea

We report *ex-situ* conversion of SmBa₂Cu₃O_{7-δ} (SmBCO) films on the IBAD-MgO substrate. The IBAD-MgO substrate was prepared on Y₂O₃/Al₂O₃/hastelloy tapes, and LaMnO₃ buffer layer was deposited by the PLD method. Finally, amorphous Sm-Ba-Cu-O precursors were deposited by e-beam co-evaporation, called EDDC (Evaporation using Drum in Dual Chamber), on the LaMnO₃ buffer layer. During deposition, substrate temperature was 340 °C and the working pressure in upper chamber was 0.3 mTorr. Amorphous precursors were converted to SmBCO phase at various high temperatures in reduced oxygen atmospheres. Grain orientation of SmBCO films and thus their superconducting properties were found strongly dependent on the post annealing conditions. The optimum processing conditions resulted in SmBCO films possessing the high critical temperature (T_c) over 90 K. The relationship between processing parameters, microstructure and superconducting properties of SmBCO films will be discussed. This work was supported by a grant from Center for Applied Superconductivity Technology of the 21st century Frontier R&D Program funded by the Ministry of Science and Technology, Republic of Korea.