Enhancement of Flux Pinning by $BaMO_3$ (M : Ce, Zr, Sn) Addition in MOD-Derived YBCO Films

G. M. Shin[a], S. H. Moon[b], S. I. Yoo[a]

[a] *Department of Material Science and Engineering, Research Institute of Advanved Materials (RIAM), Seoul National University, Seoul, Korea*

[b] *Superconductor, Nano & Advanced Materials Corporation, Anyang, Gyeonggi, Korea*

For practical applications of high temperature superconductors (HTS) such as $YBa_2Cu_3O_{7-\delta}$ (YBCO), high critical current density (J_C) in high magnetic fields at 77K is desirable. To enhance the HTS current-carrying capabilities in high fields, it is critical to introduce a strong flux pinning center within the superconducting matrix by engineering defects and impurities. As such an effort, we tried to introduce the $BaMO_3$ (M : Ce, Zr, Sn) second phase particles within the YBCO superconducting film by metal-organic deposition (MOD) process. The precursor solution was prepared by mixing of Ba-TFA and fluorine-free Y, Cu, Ce, Zr and Sn precursor materials. The precursor films were coated on the $SrTiO_3$ (STO) single crystal substrates, and calcined temperature up to 500°C in pure oxygen atmosphere, finally fired at high temperature in a reduced oxygen atmosphere. These MOD-processed YBCO-$BaMO_3$ composite films commonly exhibited a significant enhancement in J_C in high fields compared with MOD-processed pure YBCO film. The flux pinning properties of YBCO-$BaMO_3$ composite films will be discussed in this presentation. 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 Education, Science and Technology, Korea.

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