

## Reel-to-Reel Processing of YBCO Coated Conductors using Fluorine-Free Y&Cu Precursor Solution.

Y. K. Kim, J. M. Yoo, K. C. Chung, J. W. Ko, W. J. Lee

*<sup>a</sup>Korea Institute of Machinery and Materials, Changwon, Korea*

YBCO coated conductors have been fabricated by reel-to-reel processing using TFA-MOD method. In this work, the fluorine-free Y & Cu precursor solution was synthesized to shorten the calcining time by reducing the evolution of HF gas thus meter-long YBCO precursor films can be made within few hours by the slot-die coating & calcination step using F-free Y & Cu precursor solution. Annealing step was followed to make YBCO films by reel-to-reel method with vertical gas flow system onto the moving tape. To increase the growth rate of the YBCO films by enhancing the removal of HF gas, low total pressure was adopted in annealing processing. And the water partial pressure and the oxygen partial pressure were varied to optimize the growth conditions. FE-SEM and XRD were used to investigate the surface morphologies and texture of the meter-long YBCO films. The 0.5m long buffered metal tape was slot-die coated and calcined up to 400°C in humid oxygen atmosphere continuously and the high temperature annealing was done up to 780°C with Ar/O<sub>2</sub> mixture by reel-to-reel method. The different thickness and morphologies was observed in cross section image of the MOD-YBCO films by FE-SEM. The coating thickness needs to be controlled precisely by slot-die gap, injection rate of precursor solution, and moving speed of the buffered metal tape. The critical current of 63A/cm-w (end-to-end) was obtained in 42cm long YBCO coated conductor using reel-to-reel approach of calcining and annealing processes.

Keywords : MOD, YBCO, coated conductor

### *Acknowledgement*

This research 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