

Evaluation of Current Transport Properties of $\text{Gd}_1\text{Ba}_2\text{Cu}_3\text{O}_7$ Coated Conductors over a Wide Range of Temperature and External Magnetic Fields

R. Fuger¹, M. Inoue¹, K. Higashikawa¹, T. Kiss¹, M. Namba², S. Awaji²,
K. Watanabe², A. Ibi³, H. Fukushima³, Y. Yamada³ and T. Izumi³

¹Dept of Electrical and Electronic Engineering, Kyushu University,
744 Motoooka, Nishi-ku, Fukuoka, 819-0395 JAPAN

²Institute for Materials, Tohoku University, Sendai, 980-8577 JAPAN

³Superconductivity Research Laboratory, ISTEK, Tokyo, 135-0062 JAPAN

E-mail: rene.fuger@super.ees.kyushu-u.ac.jp

Abstract - We have carried out detailed measurements on the electric field vs. current density (E - J) characteristics of $\text{Gd}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$ (GdBCO) coated conductors (CC) in a wide range of temperature and external magnetic fields. Four probe measurements were performed in a 20 T superconducting magnet system, which allows systematic measurements on temperature-, magnetic field- and angular-dependences of the E - J characteristics. Applying a constant electric field criterion (1 $\mu\text{V}/\text{cm}$), we have evaluated critical currents and n -values as a function of the temperature, the magnetic field and the field angle. Those results are relevant for the understanding of the practical performance of the tapes, and therefore to improve the process conditions effectively. The GdBCO CC was fabricated by the reel-to-reel PLD methods on the IBAD-MgO based substrate. The Self-field critical current of the tape was 400 A/cm-w at 77 K. The results were also compared with our previous results on YBCO CC obtained from the similar process. It is noted that the critical current of GdBCO CC is superior to those of previous YBCO CC over a wide range of practical external field and temperature.

IEEE/CSC & ESAS EUROPEAN SUPERCONDUCTIVITY NEWS FORUM (ESNF), No. 11, January 2010
Published in *Journal of Physics Conf. Series (SuST)* 234, 022009 (2010)