



Contribution ID: 338 Contribution code: TUE-PO1-609-03

Type: Poster

Conductive micro-path for current sharing between REBCO tapes in high-T_c superconducting conductors to improve stability

Tuesday, 16 November 2021 13:15 (20 minutes)

The high-temperature superconductor REBa₂Cu₃O_y (REBCO) is expected to be applied to fusion magnets because of its high critical current density at 20 K [1]. Various kinds of REBCO conductors with a large current capacity have been developed for the fusion magnets by stacking the REBCO tapes such as FAIR conductor [1]. A drawback of REBCO conductors is that the buffer layer prevents current sharing between the tapes, causing reduced conductor stability. We propose a conductive micro-paths to improve conductor stability where current is shared between the REBCO tapes. In this study, we fabricated the conductive micro-paths in REBCO tapes to investigate the current sharing in the REBCO tapes.

Blind holes were made on REBCO tapes as non-conductive micro-paths by using a Nd:YAG laser. Additional Ag films were deposited on the tapes by sputtering method to make the micro-paths conductive. We observed the microscopic structure of the blind holes and conductive micro-paths by SEM microscopy. As a result, the blind holes reached substrates of the REBCO tapes and the holes were filled by the deposited Ag films.

Two REBCO tapes, one with degradation intentionally introduced, were prepared and stacked to investigate current sharing between the tapes. Partial voltage in the tapes were measured with some voltage taps with swept current at 77 K. As a result, the current was shared between the REBCO tapes and successfully bypassed the damaged part. We will discuss improved stability of the REBCO conductors with the conductive micro-paths.

This work was partly supported by the NIFS Collaboration Research Program (NIFS21KECA090, NIFS21KOBA034), JSPS-KAKENHI (20K15217, 20H02682), JST-A-STEP, and NEDO.

[1] T. Mito et al.: J. Phys. Commun. 4, 035009 (2020).

Primary author: YAMADA, Hiroyuki (Nagoya University)

Co-authors: Dr TSUCHIYA, Yuji (Nagoya University); Prof. YOSHIDA, Yutaka (Nagoya University); Prof. MITO, Toshiyuki (National Institute for Fusion Science (NIFS)); Dr ONODERA, Yuta (National Institute for Fusion Science (NIFS)); Prof. HIRANO, Naoki (National Institute for Fusion Science (NIFS))

Presenter: YAMADA, Hiroyuki (Nagoya University)

Session Classification: TUE-PO1-609 Stability and Mechanical Properties