

WB4-1-INV

History and Future Prospects of the Development of (RE)BCO Bulk Superconductors

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(RE)-Ba-Cu-O [(RE)BCO, where RE = rare earth element such as Y, Nd, Sm, Eu, Gd, etc.] high temperature superconductors (HTS) have significant potential for high field engineering applications at temperatures above 50 K when fabricated in the form of large single grains by the so-called top seeded melt growth process (TSMG). This presentation will describe the evolution of these technically important materials over the past thirty years, the current state of the art and highlight likely areas for future development. In particular, the presentation will outline key aspects of the melt processing and characterization of large single grain bulk superconductors by different techniques, sources of flux pinning and potential areas of application.

Keywords: Bulk superconductors, (RE)BCO, Single grain, Trapped field

WB4-2-INV

History and Future Prospects of Coated Conductor Development – As a commemoration of the 30th anniversary of ISS –

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The discoveries of “high-Tc superconductors” gave us the expectation to large-scale applications of superconductors, which had been difficult to appear in the world. However, we needed a step of R&D for fabrication of superconducting wire/tape to realize the applications.

Just after the discovery, Ag-sheathed BSCCO tapes were developed and several hundred meter long tapes could stably be produced. On the other hand, it was not so easy to bring out its potential in the tape/wire shape concerning REBCO system, because the three-dimensional crystal texturing is necessary in order to realize the high superconducting properties. The principal of the solutions for obtaining the high superconducting performance in tape was already shown in the early stage of R&D. However, there were lots of difficulties for realizing the principals in the long tapes. Then, R&D of REBCO long tapes was delayed more than 10 years compared with the BSCCO tapes.

Around FY2000, the national projects for the R&D of CC were started both in Japan and U.S. and had led the development in the world according to the big expectation based on the advantages of REBCO CC. Through the ten-year activities in the projects, the product of $I_{c}L$ were drastically progressed from 100 Am to 60 kAm (e.g. 600 A-1km). Then, the development of application using CC were started in the world. Concerning the R&D of CC, the target were moved from simply long tapes to the addition of special functions such as in-field performance, low ac-loss, mechanical strength, low cost.

In this paper, the R&D history of CC will be reviewed and the future prospect in this field will be proposed.

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Keywords: superconducting tape, coated conductor, J_c , pinning centers