

Recent Challenges on REBCO Conductor and Magnet for High Field Applications and Fusion

Tuesday 10 June 2025 11:50 (40 minutes)

A notable progress has been made over the last decades in REBCO conductor and magnet technologies. Now multiple companies routinely deliver commercial-level REBCO conductors in different recipes, while various REBCO “user” magnets are currently under construction and some are even in routine service, though at low magnetic fields mostly less than 20 T. Despite the outstanding achievements by our community in both conductor and magnet, we are still struggling with critical technical challenges that limit wide spread use of REBCO beyond laboratory magnets toward general industrial use. Spatial and temporal distributions of currents—transport, screening and radial leak in case of no-insulation—are still unclear, thus precise estimation of critical current and peak magnetic stress is still challenging. As a result, modern REBCO magnets have been designed and operated without knowing their electrical and mechanical limits; to date REBCO magnets that “repeatedly” reach 20 T or greater are rare and none are under routine service. This talk begins with introduction to the recent progress in REBCO conductor and magnets, summarizes key observations and challenges, and discuss potential approaches toward practical application of REBCO technology for high field applications, not limited to fusion.

KEYWORDS

Challenge, fusion, high field, magnet, REBCO

Acknowledgement

This work was supported in part by National R&D Program through the National Research Foundation of Korea(NRF) funded by Ministry of Science and ICT(2022M3I9A1073924), in part by National R&D Program through the National Research Foundation of Korea(NRF) funded by Ministry of Science and ICT(2022M3I9A1072846), and in part by the Applied Superconductivity Center, Electric Power Research Institute of Seoul National University.

Country or International Organisation

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Session Classification: Magnets

Track Classification: Magnets