CEC-ICMC 2019 - Abstracts, Timetable and Presentations



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Type: Invited Oral Presentation

M2Or3B-02 [Invited]: Vortex pinning landscape by ion irradiation for REBCO thin films

Tuesday 23 July 2019 16:00 (30 minutes)

Raising critical current density <i>J</i>_c in REBa₂Cu₃O<i>_y</i><(REBCO, RE: Y and rare earth) tapes is very important for applications such as rotation machineries and wind turbines. Many types of nano-sized precipitates and defects have been formed to enhance vortex pinning, resulting in an increase of <i>J</i>_c under magnetic fields. Ion irradiation is a well-established method for artificially introducing a variety of defects into superconductors in a fairly predictable and control-lable manner by opting appropriate ion species and energy. Recently, a low-energy ion irradiation has been revisited as a practically feasible approach to enhance vortex pinning in REBCO tapes. Low-energy ion beam (< several MeV) can produce vacancy-interstitial type of defects, including Frenkel pairs and their clusters along cascades. We have demonstrated an enhancement of <i>J</i>_c by using low-energy ion irradiation on superconducting films.[1,2] In this talk, we present systematically the effect of low-energy ion irradiation on superconducting properties in REBCO films by means of both transport and magnetization measurements. We also discuss the relationship between the superconducting properties and the microstructures of REBCO films before and after several types of ion irradiations.

1) T. Ozaki et al., Nat. Commun. 7, 13036 (2016).

2) T. Ozaki et al., Supercond. Sci. Technol. 31, 024002 (2018).

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