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Thu-Mo-Po4.09-01 [63]: Joint properties for RE123-coated conductor in CJMB method

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The joint between two RE123-coated conductors with crystalline joint by melted bulk (CJMB) method [1, 2] has been developed for NMR and MRI. In this method, a Yb123 sheet is used between the coated conductors as a superconducting intermedium. We reported that a superconducting joint with critical current of 21.2 A at 77 K was obtained, and the persistent coil has a low resistance about 1 pΩ in 77 K. However, the critical current is still small that is one tenth of original coated conductor. In this study, we investigated microstructure and critical current of joint to clarify the joint mechanism, toward realization of a high critical current above 100 A at 77 K. The critical current of Yb123 sheet before joint is 7-16 A along c-axis (vertical direction of tape surface), which value is the same with that for the joint using one bulk. Multiple junctions using multiple Yb123 sheets are necessary to increase the critical current that can be greatly improved by using many Yb123 sheets, such as several tens, but it is important to prevent degradation of the coated conductor itself during heat treatment of joint. If there is no deterioration of the coated conductor, the same critical current as original coated conductor can be obtained in joint. Therefore, the measurements of critical current and microstructure for the coated conductor after heat treatment is important in current study. The obtained results will be presented in MT26 at Vancouver.

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[1] Xinzhe Jin, Yoshinori Yanagisawa, Hideaki Maeda and Yoshiki Takano, Superconductor Science and Technology 28 (2015) 075010 (6pp)

[2] Xinzhe Jin, Yoshinori Yanagisawa, and Hideaki Maeda, IEEE Transactions on Applied Superconductivity 28 (2018) 4602604 (4pp)

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