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M3Or3J-03: [Invited] Critical current hysteresis and flux pinning in 7 core Cu/Ag/(Ba, K)Fe2As2 tapes

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Critical current density J_c properties of 7 core Cu/Ag/(Ba, K)Fe_2As_2 (Cu/Ag/Ba122) tapes are investigated in low temperature and high magnetic field. The tape was fabricated by a powder-in-tube method with a flat-roll process [1]. The hysteresis behavior in magnetic field and its angular dependences of J_c were observed at 4.2 K and low field. The J_c values in increasing filed are smaller than those in decreasing field and upturn behaviors in field dependence of J_c appear only in increasing field. These Jc hysteresis behaviors appear in all magnetic field angle at 4.2 K below 8 T although the hysteresis width decreases when the magnetic field angle approaches to B//c. The upturn behavior of field dependent J_c in increasing field can be understood by Gurevich model based on the flux pinning of Abrikosov-Josephson vortices at grain boundaries [2]. The anomalous angular dependence of J_c, which shows a broad peak around B//c and a dip at B//ab, is observed at 4.2 K and low fields and it almost disappears at 18 T. These J_c properties can be represented by the flux pining model by nano-scaled spherical pinning centers [3, 4]. Since no any additional inclusions are introduced as pinning centers in the Ba122 tapes, the strain induced nano-scaled spherical pinning centers are considered from TEM study. It is a key to improve J_c in Ba122 tapes. The detail current transport mechanism and flux pinning will be discussed at the presentation.

[1] S. Liu *et al.*, Supercond. Sci. Technol., 30 (2017) 115007.
[2] A. Gurevich and L.D. Cooley, Phys. Rev. B., 50 (1994) 13563.
[3] T. Okada *et al.*, to be submitted.
[4] J. Luo *et al.*, IEEE TAS under review.

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