



Extra fine filamentation with width below 100 μm by ESPC method in RE123 split wire



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Introduction:

The filamentation of tape shaped RE123-coated conductors is important to reduce the shielding current from RE123 superconducting layer [1] in development of a high-field magnet such as NMR and MRI. In last year, we reported the development of split wire with 16-main-core by electrical separating by bending stress (ESBS) method [2]. In this study, to obtain more main-core, an electrical separating by pressure concentration method (ESPC) without a large bending of tape was adopted. We also improved the equipment that can produce above 12 cores simultaneously. In experiments, a 30-main-core sample was prepared and the average widths of main-core and sub-core are ~ 70 and ~ 10 μm , respectively.

[1] Xinzhe Jin, Hidetoshi Oguro, Yugo Oshima, Tetsuro Matsuda and Hideaki Maeda, "Development of a REBa₂Cu₃O_{7- δ} multi-core superconductor with "inner split" technology," Superconductor Science and Technology 29 (2016) 045006 (8pp)

[2] Xinzhe Jin, Yasuteru Mawatari, Toshihiro Kuzuya, Yusuke Amakai, Yoshinori Tayu, Naoki Momono, Shinji Hirai, Yoshinori Yanagisawa, Hideaki Maeda, "Fabrication of 16-main-core RE123 split wire using inner split method," IEEE Transactions on Applied Superconductivity 29 (2019) 6601304 (4pp)

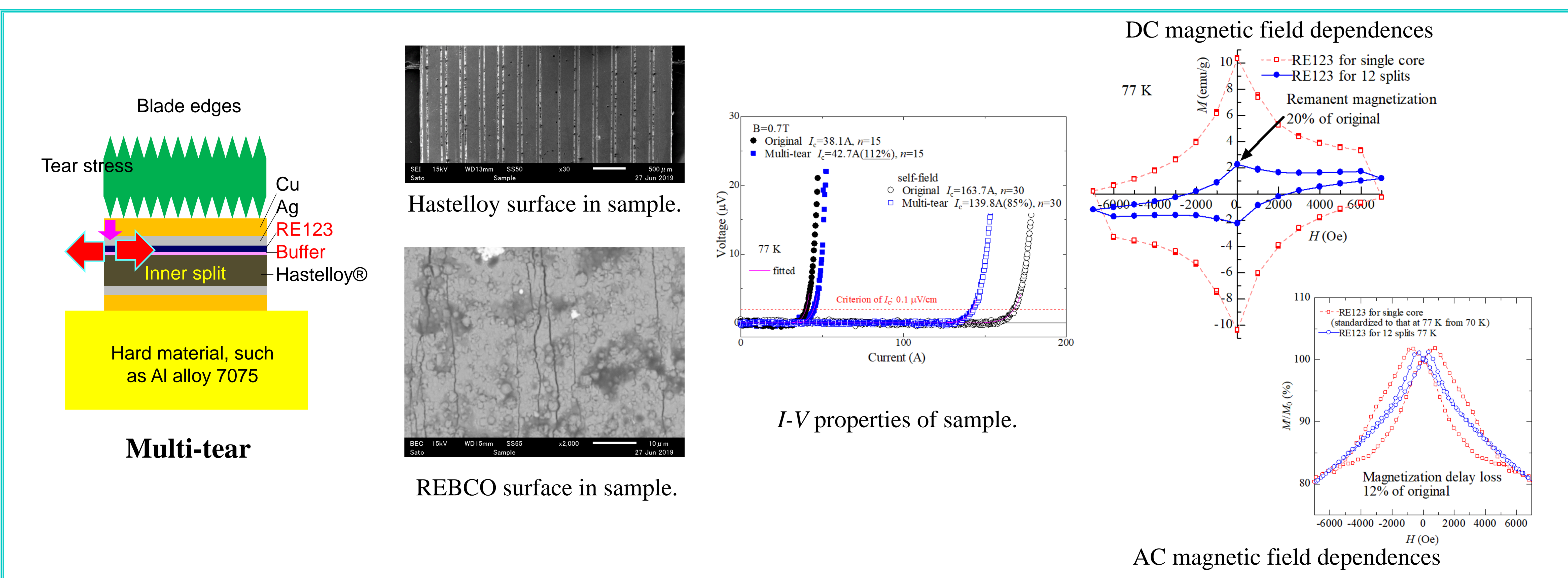
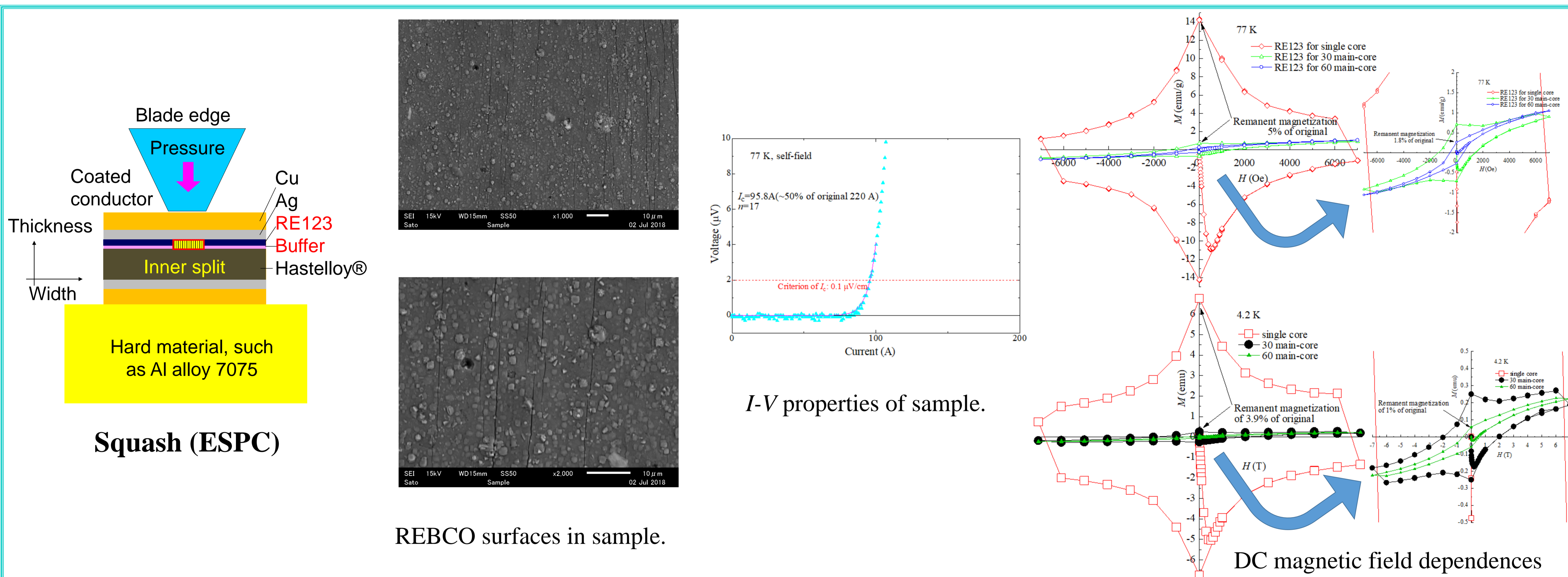
Experiments for joint

1. Fabrication method

2. Microstructure

3. Critical current

4. Magnetization



Results

Split wires with two methods were prepared with a narrow splits. The critical currents fabricated by ESPC method are largely decreased below one half of original, but the magnetizations are largely improved. By multi-tear method, the critical currents were increased than that by ESPC method, and the critical current at 0.7 T was larger than that of original about 12%. In the magnetization measurements under DC and AC magnetic field, these are decreased to 20% and 12%, respectively. Thus, a compatibility of improvements of critical current and magnetization was realized.