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

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.


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.