Contribution ID: **262** Type: **Poster Presentation of 1h45m**

Superconducting joints made using internal Mg diffusion (IMD)-processed MgB2 wires

Monday, 28 August 2017 13:15 (1h 45m)

Magnesium diboride (MgB2), which has a critical temperature (Tc) of 39 K, is a candidate for use in liquid-helium free magnetic resonance imaging (MRI). Since the discovery of MgB2, the performance of MgB2 wires and the manufacturing technology for long-length conductors have dramatically improved.Moreover, the superconducting properties of MgB2 wires have improved. Wires subjected to internal magnesium diffusion (IMD) processing show particularly high performance compared to Power-In-Tube processed MgB2 wires. Our group has been developing high-performance IMD wires with Jc and Je values greater than 100 kA /cm2 and 10 kA /cm2, respectively, at 4.2 K and 10 T. MRI magnets usually require persistent-mode operation to obtain high-quality images. Therefore, for wide applicability of MgB2 in MRI, more work is required on the joining process.
We prepared two unreacted IMD wires having a diameter of 0.8 mm. The edge of each wire was compressed by a press machine to flatten it into a tape shape . After one side of the tape was polished, two tapes were packed into a metal tube and pressed again to form a joint. The IMD wire with the joint was heat-treated at 670℃ for 6 h. We performed Ic measurements using the probe method and observed the specimens by scanning electron microscopy (SEM) after the measurements. The maximum Ic values in the wire were depressed 10% compared to those of a normal IMD-processed wire for each investigated magnetic field. However, the Ic values of the joint part at 3 T were equal to the Ic values of normal IMD wire at 10 T, suggesting that this joint was effective for use at magnetic fields weaker than 3 T. SEM observations revealed several B-rich compounds. We will report further improvements of the IMD technique.

Submitters Country

Japan

Primary author: MATSUMOTO, Akiyoshi (NIMS)

Co-author: KUMAKURA, Hiroaki (National Institute for Materials Science)

Presenter: MATSUMOTO, Akiyoshi (NIMS)

Session Classification: Mon-Af-Po1.09

Track Classification: F6 - Joints between Superconductors