

## Transport Properties of IMD-processed 100 m Class 6-filament MgB<sub>2</sub> Wire and Solenoid Coil

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**Abstract**— 100 m long 6-filament MgB<sub>2</sub> wire was successfully fabricated using the internal magnesium diffusion (IMD) process [1]. We investigated the transport properties and the uniformity of this long multifilament IMD wire. The MgB<sub>2</sub> layer and the sub-filament region are regular, and the  $J_c$  values have a fairly homogenous distribution throughout the wire, suggesting that there were no obvious defects along the length of the wire. A layer  $J_c$  as high as  $1.2 \times 10^5$  A/cm<sup>2</sup> at 4.2 K and 8 T was obtained, which was comparable to the highest value of the long multifilament IMD wire reported so far. We also made and tested two IMD-processed MgB<sub>2</sub> solenoid coils using 26 m long 6-filament wires. The coils were prepared by using a wind-and-react method and cooled by liquid helium. The coil  $I_c$  values measured at 4.2 K are almost equal to the estimated  $I_c$  values of short length wire, suggesting that the long multi-filamentary wire has sufficient longitudinal homogeneity. These results indicate that the long multifilament IMD-processed MgB<sub>2</sub> superconducting wire is suitable for practical applications.

[1] Dongliang Wang, Da Xu, Xianping Zhang, Chao Yao, Pusheng Yuan, Yanwei Ma, Hidetoshi Oguro, Satoshi Awaji, Kazuo Watanabe, Uniform transport performance of a 100 m-class multifilament MgB<sub>2</sub> wire fabricated by an internal Mg diffusion process, *Supercond. Sci. Technol.*, 2016, 29(6):065003.

**Keywords (Index Terms)**— MgB<sub>2</sub> wire and coil, internal magnesium diffusion, uniformity, transport properties.

IEEE/CSC & ESAS SUPERCONDUCTIVITY NEWS FORUM (global edition), No. 42, October 2017.

Received August 08, 2017; Selected October 17, 2017. Reference STP600; Category 5.

This invited presentation M2OrF-03 was given at CEC-ICMC 2017, July 09-13, 2017, Madison (USA).