

## Development of High Performance Iron-based Superconducting Wires and Tapes

Yanwei Ma

Institute of Electrical Engineering, Chinese Academy of Sciences, Beijing 100190, China

E-mail: [ywma@mail.iee.ac.cn](mailto:ywma@mail.iee.ac.cn)

**Abstract** — Iron-based superconductors, with  $T_c$  values up to 55 K, are of great interest for applications, due to their lower anisotropies and ultrahigh upper critical fields.

In the past years, tremendous advances have been made in the fabrication of iron-based superconducting wires and tapes using the powder-in-tube (PIT) processing method, especially for 122 family pnictide tapes. Here we review some of the most recent and significant developments in making high performance iron-based tapes by the *ex-situ* PIT process, paying particular attention to several fabrication techniques to realize high-field  $J_c$  performance in terms of increase of core density and improvement of texture. At 4.2 K, the practical level transport  $J_c$  up to 0.12 MA/cm<sup>2</sup> in 10 T and 0.1 MA/cm<sup>2</sup> in 14 T have been achieved in the K-doped 122/Ag tapes. Recently, high  $J_c$  Cu-cladded and stainless steel/Ag double-sheathed 122 tapes have also been produced in order to improve either mechanical properties or thermal stability. More importantly, the scalable rolling process has been used for the first time to demonstrate high  $J_c$  values in 122 conductor tapes of 11 m in length.

**Acknowledgement**— This work is partially supported by the National ‘973’ Program (grant No. 2011CBA00105), and the National Natural Science Foundation of China (51320105015).

**Keywords (Index Terms)** — Iron-based wires and tapes, powder in tube method, critical current density, long-length wire.