

## Status of Superconducting Materials and Applications in China

Pingxiang Zhang<sup>1,2</sup>

<sup>1</sup> Superconducting Materials Research Center, Northwest Institute for Nonferrous Metal Research, Xi'an 710016, China

<sup>2</sup> National Engineering Laboratory for Superconducting Materials (NELSM), Western Superconducting Technologies (WST) Co., Ltd., Xi'an 710018, China

E-mail: [PXZhang@c-nin.com](mailto:PXZhang@c-nin.com)

**Abstract** — Today superconducting materials have gone worldwide to large scale power applications. The success of superconducting materials has been due to their high current carrying capacities at magnetic fields sufficient for most applications. Many efforts have been made in the development and processing for Low Temperature Superconductors (LTS) and High temperature superconductors (HTS) with a high superconducting performance. In China, the progress in recent years is remarkable. In the LTS field, NbTi, internal-tin and bronze Nb<sub>3</sub>Sn wires with the high critical current density ( $J_c$ ) of 3500 A/mm<sup>2</sup> (4.2 K@5 T) and 1030 and 900 A/mm<sup>2</sup> (4.2 K@12 T), respectively, have been produced on an industrial scale, which meet the requirements of commercial use and of the International Thermonuclear Experimental Reactor (ITER) project. In the HTS field, Bi(Pb)<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>7</sub> HTS tapes over 300 m in length with the  $J_e$  value of over 250 A/mm<sup>2</sup> (4.2 K@20 T) can be fabricated. YBCO coated conductors with more than one kilometer in length have been successfully made by both MOCVD and PLD techniques, and their  $I_c$  reach 380 and 500 A/cm-width, respectively at 77K and self-field. As to power applications, a HTS Power Substation, a 220 kV FCL, and a 10kA/360m HTS DC Power Cable have been operated in the power grid. In this presentation, the recent progress of research and development in China on practical superconducting materials and power application has been reviewed. The future plans of superconducting materials and applications in China, including power cable, transformer, motor, fault current limiter have been discussed.

**Keywords (Index Terms)** — Low temperature superconductors, High temperature superconductors, Power grid applications.