Review on superconducting materials: past, present and future in China

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Abstract: In China, the R&D on Low temperature superconductor (LTS) were started at 1950's and promoted by the discovery of High temperature superconductor (HTS) in 1986. Many efforts have been made in development of processing for LTS and HTS with high superconducting performance. The first multi-filamentary NbTi wire was fabricated in 1972 in china and the critical current density (J_c) of NbTi wire reached 3450 A/mm^2 (4.2 K,5 T) in 1980, which opened a new era of NbTi superconductor. In 1987, Chinese scientists announced the structure and superconductivity of YBCO independently. R&D on superconducting materials is one of the important advanced field of both fundamental science and High-tech development in China.

Derived by requirements from commercial application (power grid, medical equipment, etc.) and large scientific device (high field magnet, accelerator, fusion, etc.), the progress on superconductor and application in recent years are remarkable in China. Today, In LTS field, NbTi and Nb_3Sn wires with high J_c have been produced in Industrial scale which meet the requirement of commercial use and International Thermonuclear Experimental Reactor (ITER) project. In HTS R&D field, Bi2223 and MgB_2 tapes with high J_c can be fabricated in a large scale. 1000m YBCO coated conductor with I_c value over 300A@77K can be produced in industrial scale by MOCVD and PLD methods. Furthermore, R&D on current lead and Bi2212 wire for 30T high field magnet and ITER application was started from 2015.

In this presentation, the past and recent progress of R&D in China on LTS (including NbTi,Nb_3Sn and Nb_3Al) and HTS (including YBCO, BSCCO, MgB_2 and iron pnictides) and the status of superconductivity application have been reviewed. Finally, the national R&D plan on superconductivity in the 13th five-year-plan (2016-2020) in China was introduced.