

Status of Iron Based Superconductors: Characteristics and Relevant Properties to Applications

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Abstract—Since the discovery of iron-based superconductors (IBSs) on LaFePO in 2006 [1], many types of IBSs have been fabricated. IBSs have usually been compared to cuprates and MgB₂, and the methodology of research developed by them have been implemented to IBSs. As a result, many similarities between IBSs and cuprates have been revealed, e.g., the parent compounds being antiferromagnets and grain boundaries being weak-links to some extent [2]. On the other hand, the distinct features of IBSs are highlighted as multiband superconductors (i.e., the 5 bands of Fe 3d orbital crossing Fermi level) and extended s-wave symmetry. Additionally, some of the IBSs are topological superconductors that can be possible platforms for quantum computing [3]. In this talk, an overview of IBS research and development in the last 18 years will be presented, involving characteristics of IBSs as well as strategies of increasing the superconducting transition temperature and critical current density. Finally, the history of research and development of IBSs is compared with those of the cuprates, and then future perspectives are discussed.

Keywords (Index Terms)—Iron-based superconductors (IBSs), multiband superconductors, grain boundaries, strain effect, wires and tapes

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