

## **Fe-based superconductors (FBS): 3<sup>rd</sup> generation superconductors**

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Superconducting wires implemented for magnets in MRI, NMR, and Maglev train have been still low- $T_c$  superconductors such as NbTi and Nb<sub>3</sub>Sn (1<sup>st</sup> generation, discovered almost 30 years ago), which require liquid helium for cooling. In Japan all liquid helium are imported from USA. Because of the recent helium crisis, the price of liquid helium is rocketing up. Therefore, to solve this crisis, cuprates (2<sup>nd</sup> generation) and pnictides (3<sup>rd</sup> generation) are attracting world-wide attention, however, those superconductors have not yet been used for those applications. One of the main reasons is the weak-link problem: supercurrent flow is significantly restricted across the grain boundary. However, it is reported that the grain boundary properties of the Fe-pnictides are superior to those of the cuprates. Therefore, Fe-pnictides are our choice of method for solving the helium crisis. In this talk I present our fundamental studies on the Fe-pnictide high temperature superconductors, particularly the grain boundary (GB) issues for Fe-pnictide superconductors for realizing the 3<sup>rd</sup> generation superconducting wires, which can be operated without liquid helium.

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