

**Systematic magnetic J_c study on iron-pnictide superconductor K, Co and P-doped
 $BaFe_2As_2$**

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For the fabrication of superconducting wire, it is one of the main issue that how to flow large amount of current without destroying the superconducting state. In the case of type II superconductor, vortex flow breaks the zero resistivity state, when the current exceeds critical current density, J_c . Thus, introducing impurity and defect which pin the vortex flow is the one way to enhance the J_c . However, prior to considering such kind of artificial treatment, searching the intrinsic factor which may play a role of natural pinning center is necessary as a starting point.

In the case of iron-pnictide superconductor, there is a twin domain issue which can be considered as a candidate of natural vortex pinning center. For this reason, we performed systematic magnetic J_c study on the single crystal $BaFe_2As_2$ with K, Co, and P doping to reveal the relation between the twin boundary and J_c . In this presentation, we will revisit phase diagram through the observed J_c phase diagram and discuss the natural pinning center of iron-pnictide superconductor