Contribution ID: **870** Type: **Poster Presentation**

M1Po2A-01 [25]: Synthetic Route to Eliminate Oxide Byproducts and Its Effects on Intergrain Connectivity in K-doped BaFe2As2 Polycrystalline Bulks

Monday 22 July 2019 14:00 (2 hours)

Practical applications of high temperature superconductors (HTS) usually demand long length wires in which the materials are inevitably polycrystalline. The critical temperature at 38 K and the high upper critical field around 90 T make K-doped BaFe2Fe2 (Ba122) attractive as a high field conductor. The last key aspect which needs to be demonstrated is high Jc in polycrystalline forms such as a bulk, wire or tape. Improving the connectivity between grains is the key fundamental to make the Jc of this material competitive as a practical HTS. Indeed the grain connectivity can be easily degraded by local or global impurity concentration and cracks at the grain boundaries (GBs). Such an unpredictable GB connectivity often causes the poor reproducibility of intergrain Jc. Our extensive analytical microscopy studies revealed that barium and potassium can segregate at the GBs along with the oxide byproducts in the final bulks. Since then, we started to evaluate the synthesis environment, especially the oxygen and moisture level inside the glovebox, tracking back the possible oxygen sources while preparing samples as well as the purity of starting materials. Utilizing high purity starting materials and very low oxygen and moisture levels inside glovebox (0.005 ppm and 0.05 ppm, respectively) suggested that the reproducibility of the intergrain connectivity largely depends on the K purity. Our recent compositional studies also indicated that the local K composition at the GBs must not be excessive. Our understanding and efforts on eliminating the source of byproducts will lead to the more sophisticated synthesis route for high Jc polycrystalline bulks towards the wires. More details will be discussed in the presentation.

Author: PAK, Chongin (Applied Superconductivity Center, National High Magnetic Field Laboratory)

Co-authors: SU, Yi-Feng (National High Magnetic Field Laboratory); COLLANTES, Yesusa (Applied Superconductivity Center, NHMFL); HELLSTROM, Eric (Applied Superconductivity Center, National High Magnetic Field Laboratory, Florida State University); LARBALESTIER, David (National High Magnetic Field Laboratory); Dr KAMETANI, Fumitake (Applied Superconductivity Center, National High Magnetic Field Laboratory, Florida State University)

Presenter: PAK, Chongin (Applied Superconductivity Center, National High Magnetic Field Laboratory)

Session Classification: M1Po2A - Bulk Superconductors