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Synthesis methods and character of iron-based mixed-anion superconductor with suppression of the amorphous FeAs impurity phase MASAYA FUJIOKA, TOSHINORI OZAKI, HIROYUKI OKAZAKI, DENHOLME SALEEM, KEITA DEGUCHI, SATOSHI DEMURA, HIROSHI HARA, TOHRU WATANABE, HIROYUKI TAKEYA, TAKAHIDE YAMAGUCHI, HIROAKI KUMAKURA, YOSHIHIKO TAKANO, National Institute for Materials Science — To obtain the high superconducting properties of polycrystalline $SmFeAsO_{1-x}F_x$, we investigated the following three synthesis methods: a high pressure synthesis, a low temperature synthesis with gradual cooling and a metal added synthesis. Generally, polycrystalline $SmFeAsO_{1-x}F_x$ is composed of superconducting grains and a little amorphous FeAs compounds. These areas randomly co-exist and amorphous areas are located between the superconducting grains. Therefore, we suggest that the superconducting current is prevented by the amorphous areas. In fact, although the single crystal of this material shows a large critical current density of 10^6 A/cm^2, polycrystalline $SmFeAsO_{1-x}F_x$ shows a significant depression of critical current density due to this grain boundary blocking effect. To obtain a high global critical current density, it is important to investigate how to remove the amorphous FeAs. It is found that the impurity phase of amorphous FeAs is decreased by using the above three synthesis methods.

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