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Influences of material processing on the microstructure and intergranular current of polycrystalline Sm1111 iron-pnictides A. YAMAMOTO, Univ. of Tokyo, J. JIANG, F. KAMETANI, A. POLYANSKII, J. WEISS, E. HELLSTROM, D. LARBALESTIER, NHMFL, A. MARTINELLI, A. PALENZONA, M. TROPEANO, M. PUTTI, Univ. of Genova, CNR-SPIN — We have prepared polycrystalline Sm1111 bulk samples by sintering and hot isostatic pressing (HIP) and studied the influence of processing on the microstructure and intergranular current. After sintering and HIPping, samples are denser with much less impurity SmOF and grain boundary wetting FeAs. They then show significantly larger hysteresis loops than as- prepared samples. But Tc of HIPed samples is lower than samples with optimal doping, indicating loss of fluorine during later processing. Nevertheless, even after the fluorine loss and its associated carrier density reduction produced by the HIP treatment, both Magneto-Optical and remanent magnetization analyses showed that the intergranular current was enhanced. We conclude that the denser microstructure and smaller impurity phase content of HIPped samples enhances their connected fraction, even as the doping state of the sample is degraded by F loss. Our study emphasizes that current transport in polycrystalline pnictides is a complex balance involving the need to control carrier density, especially at grain boundaries, while densifying the microstructure and avoiding normal-state grain boundary wetting phases like FeAs.

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