A Comparative Study of $Sr_{1-x}k_xfe_2as_2$ and $Smfeaso_{1-x}f_x$ Superconducting Tapes by Magneto-Optical Imaging

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Abstract - Using the magneto-optical imaging (MOI) technique, the intergranular critical current density J_c at various temperatures and the homogeneity of the local structure of the superconducting cores for the powder-in-tube (PIT) $Sr_{1-x}K_xFe_2As_2$ and $SmFeAsO_{1-x}F_x$ tapes are systemically investigated. These two tapes have large transport J_c over 10^4 Acm^{-2} in self-field at 20 K and 4.2 K respectively, but the J_c of the $SmFeAsO_{1-x}F_x$ tape decreases rapidly with the increasing magnetic field. The MOI characterization indicates large bulk currents circulating through the whole sample for the both $Sr_{1-x}K_xFe_2As_2$ and $SmFeAsO_{1-x}F_x$ tapes, but also reveals the inhomogeneity inside the $SmFeAsO_{1-x}F_x$ sample. The results obtained from the MO measurements can be confirmed by the magnetic hysteresis measurements M(H) and the SEM examination. The weak high-field performance of the $SmFeAsO_{1-x}F_x$ tape may be ascribed to its short-time heat treatment.

Keywords - iron-based superconductors, magneto-optical imaging, critical currents, intergranular critical current density

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