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Anisotropic superconducting properties of aligned $Sm_{0.95}La_{0.05}FeAsO_{0.85}F_{0.15}$ microcrystalline powder[1] H.C. KU, B.C. CHANG, C.H. HSU, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan, Y.Y. HSU, Department of Physics, National Taiwan Normal University, Taipei 11677, Taiwan, Z. WEI, K.Q. RUAN, X.G. LI, Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, University of Science and Technology of China, Hefei, China
— The $Sm_{0.95}La_{0.05}FeAsO_{0.85}F_{0.15}$ compound is a quasi-2D layered superconductor with a superconducting transition temperature T_c = 52 K. Due to the Fe spin-orbital related anisotropic exchange coupling (antiferromagnetic or ferromagnetic fluctuation), the tetragonal microcrystalline powder can be aligned at room temperature using the field- rotation method where the tetragonal ab-plane is parallel to the aligned magnetic field B_a and c- axis along the rotation axis. Anisotropic superconducting properties with anisotropic diamagnetic ratio $\chi_c/\chi_{ab} \sim 2.4 + 0.6$ was observed from low field susceptibility χ(T) and magnetization M(B_a). The anisotropic low- field phase diagram with the variation of lower critical field gives a zero-temperature penetration depth $\lambda_c(0)$ = 280 nm and $\lambda_{ab}(0)$ = 120 nm. The magnetic fluctuation used for powder alignment at 300 K may be related with the pairing mechanism of superconductivity at lower temperature.

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