

INVITED

In-situ Fabrication of Co-doped SrFe₂As₂ Thin Films by Pulsed Laser Deposition with Excimer Laser

Eun-Mi Choi^a, Soon-Gil Jung^a, Nam-Hoon Lee^a, Young-Seung Kwon^a, Won Nam Kang^a,
Dong Ho Kim^b, Myung-Hwa Jung^c, Sung-Ik Lee^c, and Liling Sun^d.

^a*Bk21 Physics Division and Department of Physics, Sungkyunkwan University, Suwon 440-746, Republic of Korea*

^b*Department of Physics, Yeungnam University, Gyeongsan 712-749, Republic of Korea*

^c*Department of Physics, Sogang University, Seoul 121-742, Republic of Korea*

^d*National Laboratory for Superconductivity, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, P. R. China*

The recent discovery of classes of Fe-based layered superconductors has attracted much attention to basic superconducting mechanism and practical application because of remarkably high superconducting transition temperature (T_c) and zero-temperature upper critical field ($H_{c2}(0)$) despite of ferromagnetic material base. These properties make the prospect for superconducting electronics. However success in superconducting electronics has been limited because of difficulties of fabricating high quality thin film. Here we report the growth of high-quality c-axis oriented Co-doped SrFe₂As₂ thin films with bulk superconductivity by a pulsed laser deposition (PLD) technique using 248-nm-wavelength KrF eximer laser and As-rich phase (about 30 %) target to prevent the deficiency of As in thin film. The thin film show higher superconducting transition temperature, low resistivity and smooth surface. We firstly reported magnetization versus temperature and field curve showing strong diamagnetism and transport critical current density (J_c). These results supply necessary information for practical application of Fe-based superconductor.

Keywords : Iron-based superconductor, thin film