Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Electron-doping-induced insulator-to-superconductor transition in a BiS_2-based superconductor $Sr_{1-x}La_xFBiS_2$[1] HIDEAKI SAKAI, DAICHI KOTAJIMA, KOSUKE SAITO, HIROKI WADATI, University of Tokyo, YUKI WAKISAKA, Photon Factory, KEK, MASAICHIRO MIZUMAKI, KIYOFUMI NITTA, JASRI, SPring8, YOSHINORI TOKURA[2], RIKEN Center for Emergent Matter Science, SHINTARO ISHIWATA, University of Tokyo — Recently, materials with BiS_2 layers have attracted much attention as a new family of layered superconductors. Superconductivity was first reported in $Bi_4S_4O_3$, followed by $RO_{1-x}F_xBiS_2$, $Sr_{0.5}La_{0.5}FBiS_2$, and $Bi_3O_2S_3$. So far, however, comprehensive studies about the dependence on carrier concentration have been still lacking. In this study, we have systematically synthesized polycrystalline $Sr_{1-x}La_xFBiS_2$ ($0 \leq x \leq 0.6$) to reveal the electronic phase diagram associated with the superconductivity in the BiS_2 layer. Since the density of states of the Sr, La and F orbitals is negligibly small near the Fermi level, this series of compounds would allow the rigid-band carrier doping and provide an ideal arena to study the detailed concentration dependence. The obtained phase diagram is characterized by an insulator-superconductor transition with a steep phase boundary at $x \sim 0.4$. This is markedly different from that for $RO_{1-x}F_xBiS_2$, indicating a strong impact of the blocking layer on the superconductivity. Unusual increase in T_c has been also revealed as the carrier concentration decreases toward the critical point [1]. [1] H. Sakai *et al.* JPSJ (accepted)

[1]This work was supported by the FIRST program on "Quantum Science on Strong Correlation"
[2]Also Department of Applied Physics, University of Tokyo

Hideaki Sakai
Department of Applied Physics, University of Tokyo

Date submitted: 15 Nov 2013 Electronic form version 1.4