

MAR13-2012-002199

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Scanning tunneling microscopy study on superconductivity of FeSe thin films

XUCUN MA, Institute of Physics, Chinese Academy of Sciences

Searching for superconducting materials with high transition temperature (T_C) is one of the most exciting and challenging fields in physics and materials science. By using MBE technique, we are able to prepare stoichiometric and superconducting FeSe single crystalline films on various substrates, which enables us investigate superconductivity mechanism of FeSe thin films in well-controlled way [1-3]. Most importantly, by using low temperature scanning tunneling spectroscopy, a superconductive gap as large as 20 meV and the vortex state under high magnetic field are revealed in the single unit-cell thick FeSe films on SrTiO₃(001) substrate [4]. Such a high T_C superconductor is further confirmed by recent transport measurement. The study not only demonstrates a powerful way for finding new superconductors and for raising T_C , but also provides a well-defined platform for systematic study of the mechanism of unconventional superconductivity by using different superconducting materials and substrates. The study is collaborated with Professor Qi-Kun Xue, Department of Physics, Tsinghua University, China.

References:

- [1] C. L. Song, Y. L. Wang, P. Cheng, Y. P. Jiang, W. Li, T. Zhang, Z. Li, K. He, L. L. Wang, J. F. Jia, H. H. Hung, C. J. Wu, X. C. Ma, X. Chen, and Q. K. Xue, **Science** **332**, 1410 (2011).
- [2] C. L. Song, Y. L. Wang, Y. P. Jiang, Z. Li, L. L. Wang, K. He, X. Chen, X. C. Ma, and Q. K. Xue, **Phys. Rev. B** **84**, 020503 (2011).
- [3] C. L. Song, Y. L. Wang, Y. P. Jiang, L. L. Wang, Ke He, Xi Chen, J. E. Hoffman, X. C. Ma, and Q. K. Xue, **Phys. Rev. Lett.** **109**, 137004 (2012).
- [4] Wang Qingyan, Li Zhi, Zhang Wenhao, Zhang Zuocheng, Zhang Jinsong, Li Wei, Ding Hao, Ou Yunbo, Deng Peng, Chang Kai, Wen Jing, Song Canli, He Ke, Ji Shuaihua, Jia Jinfeng, Wang Yayu, Wang Lili, Chen Xi, Ma Xucun, and Xue Qikun, **Chin. Phys. Lett.** **29**, 037402 (2012).