

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**The superconductivity in single-layer  $\text{FeTe}_{1-x}\text{Se}_x$  films on  $\text{SrTiO}_3$**

LILI WANG, XUCUN MA, QIKUN XUE, Tsinghua University, XUE TEAM — For bulk FeSe, the highest transition temperature  $T_c = 9$  K has been observed for the composition with stoichiometry  $\text{Fe}_{1.1}\text{Se}$ . The tetragonal-orthorhombic structural transition observed in FeSe is suppressed with Te substitution and the superconducting transition temperature reaches a maximum of  $T_c = 15.2$  K at about 50% Te substitution. For single-layer FeSe films on  $\text{SrTiO}_3$ , *in situ* scanning tunneling microscopy and angle resolved photoemission spectroscopy have revealed a superconducting gap as large as 20 meV, and *ex situ* transport measurements have confirmed the interface enhanced superconductivity with  $T_C$  above 55 K. Here we report a detailed *in situ* scanning tunneling microscopy and transport study of the single-layer  $\text{FeTe}_{1-x}\text{Se}_x$  films on  $\text{SrTiO}_3$ . We found that Te substitution in the single-layer FeSe films doesn't induce further increase of the transition temperature  $T_c$ , which is in contrast to the results for the corresponding bulk materials. This implies that the  $\text{SrTiO}_3$  substrates play important role in the interfacial superconductivity.

- [1] F. C. Hsu, *et al.* Proc.Natl. Acad. Sci. U.S.A. **105** 14262 (2008).
- [2] Y. Mizuguchi, *et al.*, J. Phys. Soc. Jpn. **78** 074712 (2009).
- [3] Q. Y. Wang *et al.*, Chin Phys Lett, **29**, 037402 (2012).
- [4] S. L. He, *et al.* Nature Mater. **12**, 605 (2013).
- [5] W. H. Zhang, *et al.*, Chin Phys Lett, **31**, 017401 (2014).
- [6] W. H. Zhang, *et al.*, Phys. Rev. B **89**, 060506 (2014).

Lili Wang  
Tsinghua University

Date submitted: 13 Nov 2014

Electronic form version 1.4