Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Superconductivity at 82K in half-unit-cell thick $Bi_2Sr_2CaCu_2O_{8+x}$[1] DA JIANG, TAO HU, QIAO LI, LIXING YOU, ANG LI, HAOMIN WANG, GANG MU, ZHIYING CHEN, HAORAN ZHANG, GUANGHUI YU, XIAOMING XIE, MIANHENG JIANG, State Key Laboratory of Functional Materials for Informatics, SIMIT, CAS, Shanghai, China, JIE ZHU, IPOE, School of Physics science and Engineering, Tongji University, Shanghai, China, QIUJUAN SUN, State Key Laboratory of Functional Materials for Informatics; SPE, Central South University, Changsha, China, CHENGTIAN LIN, Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany, HONG XIAO, Beijing National Laboratory for Condensed Matter Physics, IOP, CAS, Beijing, China — We report an experimental study of superconductivity in high quality single crystal Bi2212 down to half-unit-cell thick in the form of graphene/Bi2212 heterostructure. Sharp superconducting transitions were always observed above liquid nitrogen temperature (77 K). Thickness dependent T-linear ρ behavior in Bi2212 was found to be related to the superconductor-insulator quantum phase transition (S-I QPT) in 2D superconductor. The S-I QPT was supposed to occur in the disordered boson system as the critical sheet resistance equaled to the quantum resistance for pairs h/4e2 (6.45kΩ) according to our experiments. Our research revealed that besides protecting the underlying Bi2212, graphene might have helped in damping the 2D fluctuation in Bi2212.

[1]The work is supported by the "Strategic Priority Research Program (B)" (XDB04010400, 04040300 and 04020000), NSTMP (2011ZX02707), NSFC (11104303, 11274333, 11204339, 11104335, and 61136005) and 12JC1410100, 12JC1403900 2011CBA00107 and 2012CB921302

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Date submitted: 14 Nov 2013 Electronic form version 1.4