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STM/S study on the role of Arsenic in Iron-based Superconductivity at Atomic Scale S. H. PAN, Inst. of Physics, CAS; TcSUH, Univ. of Houston, J. X. YIN, Institute of Physics, CAS, ZHENG WU, TcSUH, Univ. of Houston, ANG LI, TcSUH, Univ.of Houston, J. H. WANG, TcSUH, Univ. of Houston, X. J. LIANG, Institute of Physics, CAS, C. L. ZHANG, Rice Univ, P. C. DAI, Rice University, C. -S. TING, TcSUH, Univ of Houston, J. P. HU, Institute of Physics, CAS, Z. Q. WANG, Boston College, H. P. HOR, TcSUH, Univ. of Houston, G. F. CHEN, HONG DING, Institute of Physics, CAS — We use scanning tunneling microscopy /spectroscopy to investigate the role of Arsenic in superconducting Ba0.4K0.6Fe2As2 by directly breaking and repairing the local Fe-As structure. After the up-As-layer peeled away, the tunneling spectrum of the exposed Fe surface reveals a shallow incoherent gap, indicating a severe suppression of superconductivity without As covering. When an As-dimmer is placed on the same Fe surface, a localized topographic feature is formed due to p-d orbital hybridization and the superconducting coherent peaks recover locally with the superconducting gap size exactly the same as the Fe-layer with a complete As-coverage. These observations unravel the Fe-As interactions on an atomic scale and imply its essential roles in the Fe-based superconductivity.

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