Abstract Submitted
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Proximity induced superconductivity in Au(111) surface state with strong Rashba spin-orbit coupling[1] PENG WEI, Francis Bitter Magnet Lab and Department of Physics, MIT, ANDREW POTTER, Department of Physics, UC Berkeley, FERHAT KATMIS, Francis Bitter Magnet Lab and Department of Physics, MIT, PATRICK LEE, Department of Physics, MIT, JAGADEESH MOODERA, Francis Bitter Magnet Lab and Department of Physics, MIT — The surface state with Rashba type spin-orbit coupling (SOC) and induced *s*-wave superconductivity (SC) has been predicted as an excellent platform for topological SC.[1,2] Large SOC energy splitting is essential in protecting the topological SC from disorders. Metallic surface states, i.e. Au(111), has been known to possess SOC splitting as large as 50 meV - a candidate superior to many semiconductor materials. We present our experimental demonstrations on the proximity induced SC in Au(111), for the first time, by tunneling studies. We have successfully achieved epitaxial growth of gold/SC bilayers with clean interface. Structural analyses show excellent sample quality with minimal surface roughness. Planar tunnel junctions are made, where clear Shockley surface state of Au(111) was observed at about 450 meV below the Fermi energy. SC tunneling spectroscopy reveals unconventional two gap features on Au(111) that is attributed to the induced surface SC. Further results about ongoing tunneling studies in lithographically patterned Au(111) nanowires will also be discussed. [1] A. C. Potter & P. A. Lee. *Phys Rev B* **83**, 094525 (2011); [2] A. C. Potter & P. A. Lee. *Phys Rev B* **85**, 094516 (2012)

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