Abstract Submitted
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Superconducting tunneling studies on thin film gold nanowires coupled to a BCS superconductor[1] PENG WEI, Department of Physics and Francis Bitter Magnet Lab, MIT, FERHAT KATMIS, CUI-ZU CHANG, Francis Bitter Magnet Lab, MIT, PATRICK LEE, Department of Physics, MIT, JAGADEESH MOODERA, Department of Physics and Francis Bitter Magnet Lab, MIT — The nanowire patterned out of (111)-oriented gold thin film is an excellent candidate for hosting Majorana bound states (MBS) when it is coupled to an s-wave superconductor [1]. The robust MBS is guaranteed by the large Rashba spin-orbit coupling (SOC) of gold surface state, as well as by large spatial separations between the two MBS in fabricated micrometer size long nanowires. In addition, being able to produce complex nanowire circuit, our approach is better streamlined for achieving the braiding circuit of Majorana fermions.[2] We present our experimental approach of growing high quality hetero-layers consisting of epitaxial (111)-oriented gold thin film on vanadium using molecular beam epitaxy (MBE). Unique lithography processes are developed to pattern the top gold thin film into nanowires with a width around 100nm without damaging the hetero-layers such as its topography or superconducting behavior. Superconductive tunneling studies are performed over the gold nanowire using lithographically fabricated planar tunnel junctions. These tunneling characteristics will be discussed.

[1] A. C. Potter & P. A. Lee. Phys Rev B 85, 094516 (2012) [2]T. Hyart et. al., Phys Rev B 88, 035121 (2013)

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