

Abstract Submitted  
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**Superconductivity of Ultra-thin Pb films on Semiconductor  
Substrates: A Scanning Tunneling Microscopy/Spectroscopy Study<sup>1</sup>**

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CHIH-KANG SHIH, University of Texas at Austin — Ultra-thin Pb films on semiconductor substrates have exhibited many intriguing phenomena manifested by the quantum confinement of electronic states. Quantum stability has been a topic of interest for many years. Recently, it was shown that quantum confinements also play an interesting role on superconductivity. Oscillations of superconductivity gap and  $T_c$  as a function of film thickness have been observed in Pb/Si(111) and Pb/Ge(111) systems. Moreover, it is found that the superconductivity remains very robust even for films as thin as 5 ML. An interesting question arises as to what extent the robustness of superconductivity remains in even thinner regime. By using a different surface template, namely  $\sqrt{3}\times\sqrt{3}-\alpha$  Pb/Si(111) surface, we have grown uniform Pb films down to 2 ML. The film shows preferred thicknesses of 2ML and 4ML, presumably a manifestation of the quantum stability. We find that the superconducting gap remains robust down to 4ML and shows BCS-like temperature dependence. For 2ML films, we find a much smaller gap at 4.2K. Whether or not it corresponds to superconducting gap is under investigation.

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