Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Influence of quantum well states on the formation of surface Au/Pb alloy in Pb/Si(111) quantum thin films.[1] JUNGDAE KIM, SHENGYONG QIN, ALEXANDER KHAJETOORIANS, University of Texas at Austin, WENGUANG ZHU, ZHENYU ZHANG, The University of Tennessee, Oak Ridge National Laboratory, CHIH-KANG SHIH, University of Texas at Austin — The thickness dependence of Au/Pb alloy formation on thin Pb quantum films is studied using *in-situ* low temperature STM/S. Sub-monolayer Au was deposited on to thin Pb films on Si(111) substrates. When deposition is carried out at a substrate temperature close to room temperature, it is found that local Au/Pb surface alloys are formed in the form of nano-islands, with preferential formation probability at certain thicknesses. STS data shows this is directly related to quantum well states (QWS) of underlying Pb mesas. When the growth is carried out at low temperature (∼80K), the alloy formation probability doesn't show strong thickness preference, but QWS has still strong influence on the nature of the Au/Pb alloy. Two types of Au/Pb alloy nano-islands are formed with quite different electronic properties.

[1]NSF-FRG DMR-0606485

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Date submitted: 21 Nov 2008 Electronic form version 1.4