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Electron coherence in Pb/Ag heterostructures epitaxially grown on Si(111)[1] JISUN KIM, Department of Physics, The University of Texas, Austin, TX 78712, CHENDONG ZHANG, Department of Physics, The University of Texas, Austin; Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, CAS, HONGJUN GAO, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, CAS, CHIH-KANG SHIH, Department of Physics, The University of Texas, Austin, TX 78712 — Along with other metals, Pb and Ag can form globally flat ultra- thin films on the Si(111) surface. Due to electron confinement along the growth direction, such films exhibit distinctive quantum well states (QWS's). Confinement occurs between the vacuum-solid and solid-solid interfaces. It was reported earlier, using angle-resolved photoemission, that quantum confined states existing in Ag thin films can coherently propagate through a Pb overlayer with thickness much thicker than the typical electron mean free path. Here we use scanning tunneling microscopy and spectroscopy to investigate the quantum well states formed in double quantum wells (Pb quantum well and Ag quantum well) formed in Pb/Ag/Si(111) double- heterostructures. Both the growth mechanism and the coherent coupling between the Pb and Ag quantum wells will be reported.

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