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**Influence of Band Structure and Pb/Si Interfacial Property on
Transmission Resonance of Thin Pb Films by Scanning Tunneling Spec-**
troscopy S.M. LU, M.C. YANG, C.L. JIANG, H.T. SHIH, W.B. SU, C.S. CHANG,

TIEN T. TSONG, Institute of Physics, Academia Sinica, Taipei, Taiwan, Republic of China — The transmission spectrum of a metal film for free electrons at low energy may reveal resonance, which is the quantum size effect above the vacuum level. We use scanning tunneling spectroscopy to observe the transmission resonance for Pb films grown on incommensurate Pb/Si(111) and Si(111)7x7 surfaces. Our observations demonstrate that Pb band structure and Pb/Si interfaces significantly affect the signal of the transmission in the tunneling spectra. First, the transmission resonance is not detectable in the range of 5~6 eV above Fermi level, which can be attributed to that Pb band structure along the (111) direction in this energy range is flat. Secondly, the signal of the transmission resonance acquired on Pb films/incommensurate Pb/Si(111) is more obvious than that acquired on Pb films/Si(111)7x7. This difference can be attributed to that the Pb/Si interface for the former is adiabatic but is non-adiabatic for the latter.

S.M. Lu

1. Institute of Physics, Academic Sinica, Taipei, Taiwan, Republic of China
2. Department of Physics, National Taiwan University, Taipei, Taiwan

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