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Correlation between Electron Reflectivity and Quantum Bound States Observed by Scanning Tunneling Spectroscopy on Ag Thin Film WEI-BIN SU, SHIN-MING LU, HWA-TE SHU, CHI-LUN JIANG, CHIA-SENG CHANG, TIEN-TZOU TSONG, Institute of Physics, Academia Sinica, Taipei, Taiwan, Republic of China — The transmission coefficient of a metal film for free electrons at low energy often reveals peaks that are associated with quantum well (QW) resonances above the vacuum level. We have observed that QW resonance peaks can also be observed on Ag films grown Si(111)7×7 with scanning tunneling spectroscopy (STS). It indicates the transmission density of states probed by STS is equivalent to the transmission coefficient in free space. This equivalence is no longer valid for the reflectivity of the free electron. The distinct quantum bound states (QBS), which do not appear in the reflectivity spectra of free electron, are observed by STS. The total density of states of each QBS is equal to a total electron reflectivity in the energy distribution of the QBS, manifesting a correlation between electron reflectivity and QBS.

Wei-Bin Su
Institute of Physics, Academia Sinica, Taipei, Taiwan, Republic of China

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