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Scanning Tunneling Spectroscopy Observation of New Type of Resonances on the Dense Pb Overlayer on the Si(111) SHIN-MING LU, H.Y. CHOU, Institute of Physics, Academia Sinica, Nankang, Taipei 115, Taiwan, Y.P. CHIU, Department of Physics, National Sun Yat-Sen University, Kaohsiung 804, Taiwan, W.B. SU, P.H. CHU, C.L. JIANG, C.S. CHANG, Institute of Physics, Academia Sinica, Nankang, Taipei 115, Taiwan, H.L. HSIAO, Department of Physics, Tunghai University, Taichung 407, Taiwan, TIEN T. TSONG, Institute of Physics, Academia Sinica, Nankang, Taipei 115, Taiwan — We use scanning tunneling spectroscopy (STS) to investigate the electronic structures of the dense Pb overlayers of 1×1 , $\sqrt{7}\times\sqrt{3}$ and stripe incommensurate (SIC) phases grown on the Si(111) surface. Although their atomic structures are all very different, very surprisingly the STS spectra of these three phases show a nearly identical oscillatory feature with two resonance peaks. These resonances are not the common quantum-well states but the energy bands originating from the dominant 1×1 potential in these phases. However, the local electronic states found by STS on the $\sqrt{7}\times\sqrt{3}$ and SIC phase exhibit that the resonances can be affected locally by the superstructures of two phases. It reflects that there exists a weak additional one-dimensional periodic potential on the $\sqrt{7}\times\sqrt{3}$ phase and the SIC phase is of the local variation of the work function.

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