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Phase transition induced surface electronic states on Pb/Si(111) surface[1] HSING-YI CHOU, WEI-BIN SU, CHI-LUN JIANG, MING-CHI YANG, CHUN-LIANG LIN, CHIA-SENG CHANG, TIEN-TZOU TSONG, Insitute of Physics, Academia Sinica, 115 Nankang, Taipei, Taiwan — It is known that the 1×1 phase of a monolayer Pb on Si(111) surface at room temperature may undergo a phase transition into a $\sqrt{7}$x$\sqrt{3}$ phase at a low temperature below 250K. We use scanning tunneling spectroscopy to study electronic structures on both 1×1 and $\sqrt{7}$x$\sqrt{3}$ phases. Our observation reveals that the electronic structures of Pb overlayer are significantly affected because of phase transition. In tunneling spectra there appears two distinct peaks on $\sqrt{7}$x$\sqrt{3}$ phase but they disappear on 1×1 phase, indicating that the phase transition can induce the formation of the surface electronic states on $\sqrt{7}$x$\sqrt{3}$ phase. Moreover, the peak intensity is location-dependent and the relative strength at the low-energy peak can be reversed at the high-energy peak. These phenomena can be qualitatively explained by Kronig-Penney model.

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