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Low-temperature scanning tunneling spectroscopy of Si(111) 7x7 near the Fermi energy SHENGYONG QIN, DAEJIN EOM, CHIH-KANG SHIH, Department of Physics, the University of Texas at Austin, Austin TX 78712 — Si(111) 7x7 is probably the most widely studied surface in surface sciences. Scanning tunneling microscopy/spectroscopy (STM/S) have been applied extensively to and have provided very detailed understanding of the atomic and electronic structures of this surface, revealing adatom, dangling bond and backbond states. Most spectroscopic studies however, have focused on the electronic structures far away from the Fermi energy. The metallic nature of this surface, however, makes it interesting to explore the electronic states near Fremi energy. Moreover, theoretical studies of this surface suggested important correlation effects. By using a low temperature STM (about 5K), we reported studies of electronic structures near the Fermi energy. In addition to the real-space distribution of density of states directly revealed by STS, Fourier analysis is used to obtain k-space electronic structures. We confirm that the surface is metallic with appreciable DOS, however with a small gap (about 0.15 eV) below the Fermi energy. Moreover, Fourier space analysis reveals what appears to be a Fermi surface in the extended zone scheme, although further investigation is needed to confirm this observation.

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