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Room Temperature Ferroelectricity in Ultrathin SnTe Films[1] KAI CHANG, Tsinghua University, JUNWEI LIU, Massachusetts Institute of Technology, HAICHENG LIN, KUN ZHAO, YONG ZHONG, SHUAI-HUA JI, KE HE, LILI WANG, XUCUN MA, Tsinghua University, LIANG FU, Massachusetts Institute of Technology, XI CHEN, QI-KUN XUE, Tsinghua University — The ultrathin SnTe films with several unit cell thickness grown on graphitized SiC(0001) surface have been studied by the scanning tunneling microscopy and spectroscopy (STM/S). The domain structures, local lattice distortion and the electronic band bending at film edges induced by the in-plane spontaneous polarization along $\langle 110 \rangle$ have been revealed at atomic scale. The experiments at variant temperature show that the Curie temperature T_c of the one unit cell thick (two atomic layers) SnTe film is as high as 280K, much higher than that of the bulk counterpart ($\sim$100K); and the 2-4 unit cell thick films even indicate robust ferroelectricity at room temperature. This T_c enhancement is attributed to the stress-free interface, larger electronic band gap and greatly reduced Sn vacancy concentration in the ultrathin films. The lateral domain size varies from several tens to several hundreds of nanometers, and the spontaneous polarization direction could be modified by STM tip. Those properties of ultrathin SnTe films show the potential application on ferroelectric devices.

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