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Electronic Structure of Self-Organized Graphene Nanostructures on SiC(0001)[1] YUNTAO LI, DAVID B. TORRANCE, JAMES O. ANDREWS, PHILLIP N. FIRST, Georgia Institute of Technology — Graphene nanostructures directly grown on SiC are appealing for their potential application to nanoscale electronic devices. We use different methods to control the step morphology of the SiC(0001) surface in order to guide the growth of graphene, which initiates at step edges. "Sidewall" graphene nanoribbons can be formed on step bunches by limiting the graphene growth. We study such nanostructures via scanning tunneling spectroscopy (STS) in ultra-high vacuum. Significant features are observed in tunneling dI/dV spectra, which we interpret in terms of both strain and quantum confinement. Scanning tunneling microscopy (STM) reveals that the epitaxy between SiC and layer-zero (buffer-layer) graphene on nearby terraces determines the crystalline orientation of the sidewall nanoribbons on step-bunches. We also find a somewhat variable character to the insulating buffer layer, depending on growth conditions and air exposure.

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