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Electronic and Magnetic Properties of Epitaxial Graphene Sidewall Nanoribbons JOHN HANKINSON, MING RUAN, JAMES PALMER, WENLONG YU, RUI DONG, CHAO HUAN, ZHIGANG JIANG, Georgia Institute of Technology, School of Physics, CLAIRE BERGER, Georgia Institute of Technology, School of Physics; CNRS Insitute Neel, WALT DE HEER, Georgia Institute of Technology, School of Physics — Confinement controlled sublimation growth of epitaxial graphene on silicon carbide has proven to be a viable method for the production of high quality graphene for use in nanoelectronics. However, patterning of bulk graphene using oxygen plasma leads to rough edges that cause electronic transport in nanostructures to be dominated by edge scattering through localization and quantum dot effects. To overcome this, we have developed a method to create graphene nanostructures directly during growth. For this the SiC substrate is etched to reveal sidewall facets that graphitize more readily than the SiC (0001) face. High temperature growth on such pre-patterned SiC yields graphene nanoribbons only a few tens of nanometers wide with well-controlled edges anchored to the SiC substrate. Here we present these growth techniques as well as experimental evidence showing that the resulting ribbons are metallic with unique spin transport properties.

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