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Engineering The Energy Band Gap of Graphene Quantum Structures MELINDA HAN, YUANBO ZHANG, Columbia University, BARBAROS OEZYILMAZ, Columbia Universiity, PHILIP KIM, Columbia University — We report on experimental studies of electrical transport in patterned graphene ribbon structures where the lateral confinement of charge carriers creates an energy gap near the charge neutral Dirac point. Single graphene layers are contacted with metal electrodes and patterned into ribbons of varying widths (10 to 100nm) and orientations. Energy gaps of the ribbons are investigated using both stability diagrams obtained at low temperatures (1.7K) and temperature dependent conduction behavior. An understanding of ribbon dimension and orientation as control parameters for the electrical properties of graphene structures can be seen as a first step toward the development of graphene-based electronic devices.

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