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# An epigraphene platform for coherent 1D nanoelectronics

Exceptional edge state ballistic transport, first observed in graphene nanoribbons grown on the sidewalls of trenches etched in electronics grade silicon carbide even at room temperature, is shown here to manifest in micron scale epigraphene structures that are conventionally patterned on single crystal silicon carbide substrates. Electronic transport is dominated by a single electronic mode, in which electrons travel large distances without scattering, much like photons in an optical fiber. In addition, robust quantum coherence, non-local transport, and a ground state with half a conductance quantum are also observed. These properties are explained in terms of a ballistic edge state that is pinned at zero energy. The epigraphene platform allows interconnected nanostructures to be patterned, using standard microelectronics methods, to produce phase coherent 1D ballistic networks. This discovery is unique, providing the first feasible route to large scale quantum coherent graphene nanoelectronics, and a possible inroad towards quantum computing.