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Crystallographic Cuts in Single Layer Graphene LEONARDO CAMPOS, VITOR MANFRINATO, JAVIER SANCHEZ, JING KONG, PABLO JARILLO-HERRERO, MIT — Graphene consists of a single monolayer of carbon atoms in a honeycomb 2D crystal. It is unique because the electrons are described by the Dirac equation, like ultrarelativistic particles with zero rest mass. According to theoretical predictions, it is possible to create field effect transistor just using narrow (d<10nm) nanoribbons. With zigzag edges, graphene nanoribbons can have a large magneto-resistance or could be used to produce a spin valve. With armchair edges it is possible to have an energy gap controllable by electric field. In this work we will show how to use Ni nanoparticles to create crystallographic oriented cuts in exfoliated graphene. Using Raman spectroscopy and electronic measurements of Dirac peaks, we have verified that the graphene, after the high temperature nanocut etching process, are still high quality 2D crystals, indicating that this process can be used to produce graphene nanodevices. Using this method we fabricate oriented nanoribbons and equilateral triangles with varying size. We also present a detailed analysis of the fabrication conditions for controlling the etching characteristics. Last, we present our analysis of the chirality of our nanocuts.

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