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Edge effects in graphene nanoislands on Co(0001) DEBORAH PREZZI, Columbia University & S3-CNR, DAEJIN EOM, Columbia University, ANDREA FERRETTI, MIT & S3-CNR, KWANG T. RIM, HUI ZHOU, MICHAEL LEFENFELD, COLIN NUCKOLLS, Columbia University, MARK S. HYBERTSEN, Brookhaven National Laboratory, TONY F. HEINZ, GEORGE W. FLYNN, Columbia University — We recently demonstrated the growth of regularly shaped, nanoscale graphene islands of graphene on Co(0001) surfaces [1]. Here we combine low-temperature scanning tunneling microscopy (STM) measurements and DFT based calculations to study their edge properties. These graphene nanoislands reveal a well-ordered structure at the edges, with predominant zigzag termination. STS tunneling spectra show prominent peaks at low bias, where the edges dominate the images. DFT calculations provide insights into the relative stability of different edge configurations and passivation conditions, as driven by interactions with Co. The coupling with the substrate results also in a dramatic modification of both electronic and magnetic properties at the edges. In order to study hybridization and size effets, we transform to localized Wannier states and develop a minimal model for the effective π states of these graphene nanostructures. [1] D. Eom et al., Nano Lett. 9, 2844 (2009).

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