

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Graphene nanoribbons without cutting graphene**<sup>1</sup> MATHEUS PAES LIMA, University of São Paulo, ALEXANDRE REILY ROCHA, University of ABC, ANTÔNIO J.R. DA SILVA, ADALBERTO FAZZIO, University of São Paulo — We show that the 2D periodic graphene deposited on Silicon Carbide surface with a trench mimics a graphene nanoribbon. Our study is carried out with calculations based on Density Functional Theory. In our work, the graphene is deposited at the [0001] and the [0001<sup>-</sup>] surfaces. We investigate the influence of the charge transfer between the graphene and the substrate, the local magnetic moment, as well as the direction of the trench on the electronic properties of such systems. Our results suggest that at the [0001] surface the charge transfer is large resulting in a large change in the Fermi energy. As a consequence, the mimicked armchair graphene nanoribbons turn out to be metallic and the mimicked zigzag graphene nanoribbons are nonmagnetic. These properties are distinct from the corresponding free standing graphene nanoribbons. On the other hand, at the [0001<sup>-</sup>] surface, the charge transfer is small, and the properties of the mimicked ribbons are very similar to the free standing ones.

<sup>1</sup>The authors would like to thank the Brazilian agencies FAPESP and CNPq for financial support.

Matheus Paes Lima  
University of São Paulo

Date submitted: 20 Jan 2010

Electronic form version 1.4