Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Developing resonant tunneling devices based on graphene ERIC YU, SANDIP TIWARI, Department of Electrical and Computer Engineering, Cornell University, DEREK STEWART, Cornell Nanoscale Facility, Cornell University — We present an *ab-initio* study of the electronic properties of patterned graphene structures as candidate resonant tunneling devices. We consider graphene nanoribbons that have been modified with one or more narrow constrictions or patterned with periodic nanoscale antidotes[1]. Specifically, we focus on semi-metallic armchair nanoribbons with narrow semiconducting regions and semi-metallic zigzag nanoribbons patterned with antidots. Using a first-principles density functional theory (DFT) approach, we investigate the induced band-gap opening and transmission coefficients. We examine how varying the lengths of the constrictions, changing the separation between dots and their sizes affect transport properties. We will also discuss I-V characteristics of these graphene structures and evaluate the possibility of a negative differential resistance in these devices. [1] T. G. Pedersen *et al.*, *Physical Review Letters*, **100** 136804 (2008)

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Date submitted: 21 Nov 2008 Electronic form version 1.4