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Modeling of graphene nanoscroll conductance with quantum capacitanceeffect

Mehdi Saeidmanesh[1,2] and **Razali Ismail[1]**

[1]Computational Nanoelectronic Research Group (CoNE) Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Malaysia
[2]Willowglen MSC Berhad, Malaysia

Graphene nanoscrolls (GNSs) as a new category of quasi one dimensional belong to the carbon-basednanomaterials, which have recently captivated the attention of researchers. The latest discoveriesof exceptional structural and electronic properties of GNSs like, high mobility, controllable bandgap and tunable core size has become a new stimuli for nanotechnology researchers. Fundamentaldescriptions about structure and electronic properties of GNSs have been investigated in order toapply them in nanoelectronic applications like nanotransistors and nanosensors as a new semiconductingmaterial. By utilizing a novel approach, the analytical conductance model (G) of GNSswith the effect of Hall quantum is derived. This letter introduces a geometry-dependent modelto analyze the conductance of GNSs. The conductance modeling of GNS in parabolic part of theband structure which displays minimum conductance near the charge neutrality point is calculated.Subsequently, the effect of temperature and physical parameters on GNS conductivity is studied.This study emphasized that the GNS is a promising candidate for new generation of nanoelectronicdevices.

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