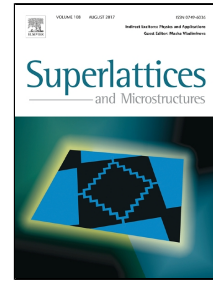


# Accepted Manuscript

Performance Comparison of Ideal and Defected Bilayer Graphene Nanoribbon FETs

Hassan Shamloo, Rahim Faez, Atefeh Nazari



PII: S0749-6036(17)31133-3

DOI: 10.1016/j.spmi.2017.06.039

Reference: YSPMI 5088

To appear in: *Superlattices and Microstructures*

Received Date: 06 May 2017

Accepted Date: 14 June 2017

Please cite this article as: Hassan Shamloo, Rahim Faez, Atefeh Nazari, Performance Comparison of Ideal and Defected Bilayer Graphene Nanoribbon FETs, *Superlattices and Microstructures* (2017), doi: 10.1016/j.spmi.2017.06.039

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Performance Comparison of Ideal and Defected Bilayer Graphene Nanoribbon FETs

Hassan Shamloo <sup>a\*</sup>, Rahim Faez <sup>b</sup>, Atefeh Nazari <sup>c</sup>

<sup>a</sup> *Department of Engineering, Buin-Zahra Branch, Islamic Azad University, Buin-Zahra, Qazvin, Iran, 3451686799*

<sup>b</sup> *Electrical Engineering Department, Sharif University of Technology, Tehran, Iran, 1458889694*

<sup>c</sup> *Department of Electrical, Biomedical and Mechatronics Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran, 3419915195*

## Abstract

Bilayer graphene has a zero bandgap as the same as monolayer graphene, and thus behaves like a semimetal. Recent studies have shown different methods for opening bandgap of bilayer graphene. One of the opening bandgap methods is using graphene nanoribbons. By applying a defect, there is more increase on band gap of a double-gated armchair bilayer (BL) graphene nanoribbon (GNR) field effect transistor (BLGNRFET). In this paper, a double-gated armchair BLGNRFET with one single vacancy (1SV) defect (so-called 1SVBLGNRFET) on top layer studied and compared with Ideal BLGNRFET (No defect). The results show that BLGNRFET with a single vacancy (SV) defect in one of layers (top layer) has a larger bandgap than Ideal BLGNRFET. The proposed new structure of BLGNRFET, which has one single vacancy defect in one of layers, shows that a defect in one of layers of BLGNRFET rarely affects the other layer of BLGNRFET. The proposed structure with one single vacancy (SV) defects (so-called 1SVBLGNRFET) has 94% larger  $(I_{ON}/I_{OFF})$  ratio than (No defect) Ideal structure BLGNRFET but this increase of  $(I_{ON}/I_{OFF})$  ratio still remains insufficient for obtaining an acceptable  $(I_{ON}/I_{OFF})$  ratio in CMOS performance. The energy band structure of nanoribbon is obtained by using an approximation tight-binding (TB) method. Transfer characteristic of the transistor is calculated with Poisson-Schrodinger equation self-consistently by using Non-Equilibrium Green Function (NEGF) and in the real space approach.

**Keywords:** Armchair bilayer graphene nanoribbon field effect transistor; Single vacancy defect (SV); Non-equilibrium Green's function (NEGF); Real space approach; Tight-binding.

## 1. Introduction

\* Corresponding author: Hassan Shamloo  
E-mail: [hassan\\_shamloo@yahoo.com](mailto:hassan_shamloo@yahoo.com)

Download English Version:

<https://daneshyari.com/en/article/7939859>

Download Persian Version:

<https://daneshyari.com/article/7939859>

[Daneshyari.com](https://daneshyari.com)