

Accepted Manuscript

Vibration analysis of defected and pristine triangular single-layer graphene nanosheets

M. Mirakhory, M.M. Khatibi, S. Sadeghzadeh

PII: S1567-1739(18)30204-9

DOI: [10.1016/j.cap.2018.07.014](https://doi.org/10.1016/j.cap.2018.07.014)

Reference: CAP 4796

To appear in: *Current Applied Physics*

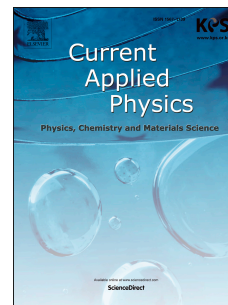
Received Date: 7 May 2018

Revised Date: 8 July 2018

Accepted Date: 15 July 2018

Please cite this article as: M. Mirakhory, M.M. Khatibi, S. Sadeghzadeh, Vibration analysis of defected and pristine triangular single-layer graphene nanosheets, *Current Applied Physics* (2018), doi: 10.1016/j.cap.2018.07.014.

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.



Vibration analysis of defected and pristine triangular single-layer graphene nanosheets

M. Mirakhory¹, M. M. Khatibi^{2,*}, S. Sadeghzadeh³

¹ MSc. student, Modal Analysis Lab., School of Mechanical Engineering, Semnan University, Semnan, Iran

^{2,*} Corresponding author, Assistant Professor, Modal Analysis Lab., School of Mechanical Engineering, Semnan University, Semnan, Iran, mmkhatibi@semnan.ac.ir

³ Assistant Professor, Smart Micro/Nano Electro Mechanical Systems Lab (MNEMS), School of New Technologies, Iran University of Science and Technology, Tehran, Iran

Abstract

This paper investigates the vibration behavior of pristine and defected triangular graphene sheets; which has recently attracted the attention of researchers and compare these two types in natural frequencies and sensitivity. Here, the molecular dynamics method has been employed to establish a virtual laboratory for this purpose. After measuring the different parameters obtained by the molecular dynamics approach, these data have been analyzed by using the frequency domain decomposition (FDD) method, and the dominant frequencies and mode shapes of the system have been extracted. By analyzing the vibration behaviors of pristine triangular graphene sheets in four cases (right angle of 45-90-45 configuration, right angle of 60-90-30 configuration, equilateral triangle and isosceles triangle), it has been demonstrated that the natural frequencies of these sheets are higher than the natural frequency of a square sheet, with the same number of atoms, by a minimum of 7.6% and maximum of 26.6%. Therefore, for increasing the resonance range of sensors based on 2D materials, non-rectangular structures, and especially the triangular structure, can be considered as viable candidates. Although the pristine and defective equilateral triangular sheets have the highest values of resonance, the sensitivity of defective (45,90,45) triangular sheet is more than other configurations and then, defective (45,90,45) sheet is the worst choice for sensor applications.

Keywords: Resonance; Pristine and defected Triangular sheet; Graphene; Molecular dynamics; Frequency domain decomposition

Download English Version:

<https://daneshyari.com/en/article/11008835>

Download Persian Version:

<https://daneshyari.com/article/11008835>

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