Orissa Journal of Physics
ISSN 0974-8202

Vol. 22, No.1
February 2015
pp. 115-130

Tight-binding Theoretical Study of Band Gap Opening in Graphene

S SAHU[1] and G.C. ROUT[2]

[1]School of Applied Sciences (Physics),Campus-3, KIIT University,Odisha, India
[2]Physics Enclave, PlotNo.- 664/4825, Lane-4A,Shree Vihar, Chandrasekharpur, PO-Patia, Bhubaneswar- 751024, Odisha, India

Received: 10.11.2014 ; Accepted : 15.1.2015

Abstract. We report here the tight-binding model calculation for tuning the band gap in semimetallic graphene near Dirac point by various interactions. We propose a model Hamiltonian consisting of hopping of electrons up to third nearest-neighbors, substrate effect ,Coulomb interaction, electron-phonon interaction and high frequency phonon vibrations and finally the bilayer graphene. We calculate physical parameters by Green's function technique and investigate the band gap opening due to different approach.

Keywords. Graphene, Coulomb interaction, electron-phonon interaction, bilayer raphene
PACS Nos. 81.05.ue., 73.22.pr, 72.80.Vp

[Full Paper]