World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:13, No:06, 2019

Performance of Armchair Graphene Nanoribbon Resonant Tunneling Diode under Uniaxial Strain

Authors : Milad Zoghi, M. Zahangir Kabir

Abstract : Performance of armchair graphene nanoribbon (AGNR) resonant tunneling diodes (RTD) alter if they go under strain. This may happen due to either using stretchable substrates or real working conditions such as heat generation. Therefore, it is informative to understand how mechanical deformations such as uniaxial strain can impact the performance of AGNR RTDs. In this paper, two platforms of AGNR RTD consist of width-modified AGNR RTD and electric-field modified AGNR RTD are subjected to both compressive and tensile uniaxial strain ranging from -2% to +2%. It is found that characteristics of AGNR RTD markedly change under both compressive and tensile strain. In particular, peak to valley ratio (PVR) can be totally disappeared upon strong enough strain deformation. Numerical tight binding (TB) coupled with Non-Equilibrium Green's Function (NEGF) is derived for this study to calculate corresponding Hamiltonian matrices and transport properties.

Keywords : armchair graphene nanoribbon, resonant tunneling diode, uniaxial strain, peak to valley ratio
Conference Title : ICNN 2019 : International Conference on Nanoscience and Nanotechnology
Conference Location : Toronto, Canada
Conference Dates : June 17-18, 2019