ANALYSIS OF DIRAC POINT IN 1D PHOTONIC CRYSTAL USING MULTILAYERED NANOSTRUCTURE OF GAAS/SIO2

Sumedha Bhttacharjee[1], Nabamita Goswami[2], Ardhendu Saha[3]
Department of Electrical Engineering, National Institute of Technology Agartala

The Dirac point, as used in condensed matter physics as well as nanotechnology, designates a particular point in the energy-momentum connection of a material, also referred to as the energy dispersion relation. This location in momentum space designates a single point in the electronic band structure where the valence band and conduction band intersect. Electrons and other charge carriers behave rest mass less when they are close to the Dirac point. The linear energy-momentum connection, which resembles relativistic particles, is the cause of this. One way to alter the Dirac point properties in one-dimensional photonic crystals is to change the layer thicknesses that comprise the crystal's structure. This layer thickness fluctuation might affect the photonic band structure and cause the Dirac point to move. For the purpose of this research, a 1-D photonic crystal with fourteen different layers of silicon dioxide and gallium arsenide has been taken. By adjusting the Dirac point position and the properties of the photonic crystal, many applications in sensing, filtering, routing, switching, and even quantum technologies may be realized.

 ISBN 978-81-965908-5-7