ACCEPTED ABSTRACTS JOURNAL OF NANOMATERIALS & MOLECULAR NANOTECHNOLOGY, VOLUME 8 | DOI: 10.4172/2324-8777-C2-060

Charge carriers in quasiperiodic graphene structure

EL Albuquerque, and LR da Silva
Federal University of Rio Grande Do Norte, Brazil

Graphene is a sheet of crystal carbon that behaves as a ballistic conductor with a long mean free path that can be locally gated. Although graphene is, in many respects, similar to carbon nanotubes, from the experimental standpoint the planar character of this material makes it more amenable to microelectronic and nanoelectronic applications. The interaction of carriers with electrostatic barriers in graphene is strongly influenced by Klein tunneling (i.e. the perfect transmission of carriers through potential barriers at normal incidence). This effect has been studied for periodic potentials and the effect of disorder on the charge transport through multiple barriers has been considered. These results have highlighted the interplay between disorder and resonance effects on carrier transmission through multiple barriers, which can influence the overall conductivity of graphene-based devices. In this work we investigate the interaction of charge carriers in graphene with a series of p–n–p junctions arranged according to a deterministic quasiperiodic substitutional Fibonacci sequence, giving rise to a potential landscape with quantum wells and barriers of different widths, allowing the existence of quasi-confined states. Spectra of quasi-confined states are calculated for several generations of the Fibonacci sequence as a function of the wavevector component parallel to the barrier interfaces. Our results show that, as the Fibonacci generation is increased, the dispersion branches form energy bands are distributed as a Cantor-like set. Besides, we obtain the electronic tunneling probability as a function of energy, whose transmission peak for small incidence angles is typical of Klein tunneling. The angular dependence of the transmission spectra for carriers with energy E=50meV and potential barriers, whose height is U0=100meV depict a large transmission peak for small incidence angles, besides the presence of a large number of sharp peaks, which arise due to resonance effects.

eudenilson@gmail.com