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Study of electron transport in the n-type $Hg_{0.8}Cd_{0.2}Te$ substrate by Monte Carlo Simulations

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Abstract:

The microelectronic comprehension of phenomena that describes the behavior of the carriers in semiconductor materials requires the knowledge of the energy distribution function. This distribution function is obtained by solving the Boltzmann equation, which is very hard to solve analytically. Many methods based on modeling are actually successfully used to solve this equation. The Monte Carlo method is among the most methods used for studying electronics components operations.
It consist to follow the evolution of electron packets in real space, where each electron subjected to the electric field present in material goes interact with the crystal lattice. It is therefore an iterative process made up from a whole coasting flights stopped by optical polar interactions, and, impurities, ionization and Disorder of alloy. By applying this method to material $Hg_{0.8}Cd_{0.2}Te$. We have described the behavior of the carriers from dynamic and energetic point of view (speed and energy variation according to the field). The simulation is applied, taking into account variation of the carriers as a function of the time in the non-stationary mode, the effect of temperature, and doping concentration. The results we obtained are similar to the theoretical ones.

Keywords: simulation, method Monte Carlo, Semi-conductor on base $Hg_{0.8}Cd_{0.2}Te$, the electric field, the density the speed and the energy of the free carriers.