Volume 5, Issue 1, 2013, Pages 79-95

Analysis and optimization of In1-xGaxAsySb1-y thermophotovoltaic cells under low radiator temperatures

F. Bouzid, N. Maamri

Abstract: In this paper, we investigated the heat to electricity conversion efficiency of In1-xGaxAsySb1-yradioisotope thermophotovoltaic (RTPV) converter with x=0.8 and y=0.18, taking account of the photons with energy below the cells bandgap using a comprehensive analytical process. This was done with a computer program designed for this reason, which allowed the computation of the cell performance under a variety of specified incident radiation spectra as well as a variety of material parameters. The results show that for an emissivity value of 0.78, a cell thickness of about 7 μ m with low front recombination velocity(700cm/s),a conversion efficiency greater than 29% can be obtained for radiator's temperature of1300°k at ambient temperature. This efficiency will decrease as the cell temperature increase.

Keywords : Radioisotope, Emissivity, Recombination Velocity, Efficiency, Temperature