

Prediction of the conversion efficiency of a GaSb thermophotovoltaic converter heated by radioisotope source

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Abstract: In recent years, Gallium Antimonide (GaSb), which has smallest bandgap among III-V semiconductors family, became the subject of extensive investigations in the field of thermophotovoltaic (TPV) converters, because of the recent improvements in optoelectronic technology. In this paper, we investigated the heat to electricity conversion efficiency of a GaSb radioisotope thermophotovoltaic (RTPV) converter, taking account of the photons with energy below the cells bandgap using a comprehensive analytical process. The results show that a conversion efficiency greater than 28% can be obtained for radiator's temperature of 1600k, at ambient temperature. This efficiency will decrease as the cell temperature increase.

Keywords : Radioisotope, Emissivity, Thermophotovoltaic, Efficiency, Temperature