

Performance evaluation of a GaSb thermophotovoltaic converter

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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. This paper describes an analytical process used to evaluate the performance of a GaSb TPV converter under different levels of illumination, taking account of the photons with energy below the cells bandgap by considering the cell's reflectance to this fraction of incident radiation. The results show that a radiator temperature near 2200 K is most advantageous and a reflectance of 0.98 is necessary for below-bandgap irradiations to obtain conversion efficiency greater than 28%, at 300 K cell temperature. This efficiency will decrease as the cell temperature increase. The obtained results are found to be in good agreement with the available data.

Keywords Thermophotovoltaic - GaSb - Reflectance - Emissivity - Temperature.

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