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Efficient thermophotovoltaic solar cells on bent substrates GAGIK SHMAVONYAN[1], OVSANNA ZADOYAN, State Engineering University of Armenia — Thermophotovoltaic devices show promise as a method of reclaiming waste industrial heat and may provide a competitive and quiet low output heat conversion power supply for remote rural areas. GaSb based devices are well matched to a 1500-2000°C blackbody emission temperature as well as to the solar spectrum when paired with GaAs. The growth of GaSb on GaAs proceeds via the Stranski-Krastanow mechanism, resulting in rectangular islands of GaSb with their edges orientated along the <110>directions. The size of the islands is dependent on the growth temperature with smaller islands being produced for lower temperatures. The rectification behavior of p-GaSb/n-GaAs heterojunctions is also strongly dependent on the growth temperature. Possible mechanisms for the rectification at low temperature include more rapid turnover of interface dislocations and a corresponding reduction in carrier generation/recombination processes or passivation of defect centres by greater incorporation of impurities such as hydrogen. By optimizing the growth conditions, efficient p-GaSb/n-GaAs thermophotovoltaic devices have been produced. A series of GaSb and GaAs epilayers grown onto substrates has been used to investigate the effect of bent substrate on external quantum efficiency and spectral response.

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