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# Temperature dependent I-V characteristics of Sulphur passivated Au/n-GaSb Schottky barrier diodes

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<p>The current-voltage (I-V) characteristics of sulphur passivated n-GaSb have been studied in the temperature range 80 K - 330 K using Au Schottky barrier diodes (SBDs). The forward I-V characteristics have been analysed assuming that thermionic emission is the dominant current transport mechanism and that the barrier height patchiness takes on a Gaussian distribution. It has been found that sulphur treatment of the GaSb accompanied by prior etching steps lead to a significant improvement in the quality of the SBDs as is evidenced by the improvement in the ideality factor (n), rectification ratio, series resistance (Rs) and the barrier height (Φb) of the device, These improvements were attributed to removal of predominantly Sb-O from the GaSb surface together with passivation of surface states acting as recombination centres. Typical diode parameters obtained at room temperature (300K) were found to be to be 1.12 (n), 19.4Ω (Rs) and 0.52eV (Φb)) The ideality factor was found to diverge from unity whereas the barrier height increased with decrease in temperature. The increase in the ideality factor is attributed to the dominance of field assisted tunnelling over thermionic emission at low temperatures and is particularly severe for high free carrier concentration material. Finally, the surface state densities for sulphurized material were quantified using I-V measurements and compared to that of untreated material.

## Level (Hons, MSc, <br>   PhD, other)?

PhD

## Consider for a student <br>   award (Yes / No)?

Yes

## Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

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