

Abstract Submitted
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On The Possible Current-Conduction Mechanisms at Low temperatures in Au/n-GaAs Schottky Barrier Diodes (SBDs) SAHAR ALIALY, HALIT ALTUNTAS, SEMSETTIN ALTUNDAL, None — To determine the possible current-conduction mechanisms (CCMs) at low temperatures, Au/n-GaAs SBDs with SiO₂ interfacial layer were fabricated and their current-voltage (I-V) characteristics were carried under room temperatures (80-300 K). The ideality factor (n) and apparent barrier height (Φ_{bo}) values were found as 5.200, 0.198 eV at 80 K and 1.256, 0.613 eV at 300 K, respectively. These results indicated that possible CCM is Thermionic Field Emission (TFE) rather than Thermionic Emission (TE) or other mechanisms. While the value of Φ_{bo} increases with increasing temperature, $n\Phi_{bo}$ decreases. The negative coefficient of Φ_{bo} and BH (0K) values were found as -13×10^{-4} eV/K and 1.12 eV, respectively. This -13×10^{-4} eV/K value is close to negative temperature coefficient bandgap of GaAs (-5.405×10^{-4} eV/K). On the other hand, the high value of n especially at low temperatures cannot be also explained only by TFE theory. Such behavior of n and Φ_{bo} with temperature was explained on the basis of single Gaussian distribution (GD) of the BHs. As a result to avoid these nonideal behavior of forward bias I-V characteristics, the fabrication process should be carried out in very clear room at high vacuum, annealing of the samples, and use to a thin interfacial with high dielectric constant.

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None

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