

Poster Presentations

Temperature effects on the physical parameters of Yb/MgO/C MSM devices

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Abstract

The Yb/MgO/C metal-semiconductor-metal devices were studied by means of current- voltage characteristics in the temperature range of 300-450 K and impedance spectroscopy in the frequency range of 1.0 M-1.8 GHz. The analysis of the current-voltage characteristics have shown that the motion of the electrons in the device were subjected to a barrier height at two Schottky shoulders. The barrier height of the device increased steadily with increasing temperature showing the ability of the device to perform well even at 450 K. While current conduction mechanism was dominated by the electric field assisted thermionic emission of charged carriers causing tunneling through the barrier. The electron-hole recombination near the semiconductor -metal interface increased with temperature. In addition, the impedance spectral analysis of the device displayed a negative differential resistance and capacitance phenomena. The negative differential resistance and capacitance were important as they were employed for the cancellation of the parasitic capacitance in electron circuits that were used to amplify signals in monostable-bistable switching circuits used in mobiles.

Keywords: MgO; negative capacitance; temperature; MSM device