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Abstract : electrical properties of these wide bandgap semiconductors make them excellent candidates for high temperature and high power devices due to their high critical electric field and high thermal conductivity. Silicon Carbide(SiC) is the most developed wide bandgap semiconductor in crystal growth. In this study, a detailed experimental and theoretical analysis has been carried out for Au-SiC contacts. These metal-semiconductor contacts have been fabricated and electrically characterized experimentally as a function of temperature. In addition, we have compared theoretically between the use of Si, 4H-SiC, and 6H-SiC for high voltage diodes. Metal-semiconductor contacts were fabricated by thermal evaporation of gold (Au) on 4H-SiC wafers. Two Au-4H-SiC MS were fabricated one is p-type and lightly doped and another is n-type and heavily doped. Capacitance-Voltage (C-V) and Current-Voltage (J-V) was measured for both MS contacts as a function of temperature. From the CV measurements the barrier height and doping concentration have been determined. Au-4H-SiC p-type was very good rectifier up to 400oC. Its ideality factor was 1.73 at room temperature and decrease to 1.27 at 400oC. The saturation current was 2×10-16 Amp/cm2 at room temperature and increase to 1×10-6 Amp/cm2 at 400oC. N-type Au-4H-SiC contact was rectifier at low temperatures. For more than 200oC, it becomes non-rectifier contact. The theoretical analysis based on extensive literature review of SiC physical properties indicates that it is possible to obtain high voltage diodes in SiC with about one hundred orders of magnitude doping concentration than Si. Moreover, the thickness of the diode in SiC is much smaller compared to Si for the same high voltage support. Therefore, the series resistance is much smaller in SiC diodes. These results show that SiC is a strong candidate for high voltage and high temperature electronics

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