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A Comparative Study on Electrical Characteristics of Au/n-SiC structure, with and Without Zn-Doped PVA Interfacial Layer at Room Temperature

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Abstract : In order to obtain the detailed information about the effect of (Zn-doped PVA) interfacial layer, surface states (Nss) and series resistance (Rs) on electrical characteristics, both Au/n- type 4H-SiC (MS) with and without (Zn doped PVA) interfacial layer were fabricated to compare. The main electrical parameters of them were investigated using forward and reverse bias current-voltage (I-V), capacitance-voltage (C-V) and conductance –voltage (G/W –V) measurements were performed at room temperature. Experimental results show that the value of ideality factor (n), zero –bias barrier height (ΦBo), Rs, rectifier rate (RR=IF/IR) and the density of Nss are strong functions interfacial layer and applied bias voltage. The energy distribution profile of Nss was obtained from forward bias I-V data by taking into account voltage dependent effective BH (ΦBo) and ideality factor (n(V)). Voltage dependent profile of Rs was also obtained both by using Ohm's law and Nicollian and Brew methods. The other main diode parameters such as the concentration of doping donor atom (ND), Fermi energy level (EF).BH (ΦBo), depletion layer with (WD) were obtained by using the intercept and slope of the reverse bias C-2 vs V plots. It was found that (Zn-doped PVA) interfacial layer lead to a quite decrease in the values Nss, Rs and leakage current and increase in shunt resistance (Rsh) and RR. Therefore, we can say that the use of thin (Zn-doped PVA) interfacial layer can quite improved the performance of MS structure.

Keywords : interfacial polymer layer, thickness dependence, electric and dielectric properties, series resistance, interface state

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