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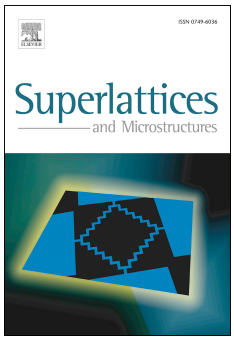

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Barrier Inhomogeneities of Platinum Contacts to 4H-SiC

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Abstract

The barrier properties of platinum contacts to lightly and highly doped (1×10^{16} cm^{-3} and 1×10^{18} cm^{-3}) 4H-SiC are investigated. The values of barrier height (BH) and ideality factor deduced from the experimental current-voltage data on the basis of thermionic emission (TE) theory for both samples are abnormally temperature dependent. The anomalies could be commented by a single Gaussian distribution (GD) of inhomogeneous BHs for the lightly doped sample, however a double Gaussianly distributed BHs for the highly doped sample. A theoretical model based on GD of inhomogeneous BHs is proposed to analyze the electrical characteristics of metal/SiC contact. The theoretical simulated characteristics are well agreement with the experimental data for the lightly doped sample. However, obvious discrepancies between the theoretical and experimental properties are observed for the highly doped sample in the low temperature range, suggesting that TE is not the dominant transport mechansm. The double GD of inhomogeneous BHs could be attributed to thermionic field emission mechanism at low temperatures.

Keywords: SiC, Barrier inhomogeneities, Gaussian distribution, Thermionic emission, Thermionic field emission