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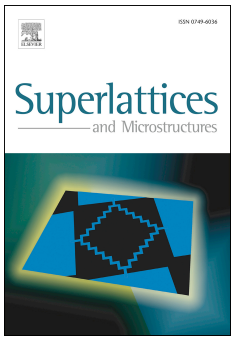

Double Gaussian barrier distribution of permalloy ($Ni_{0.8}Fe_{0.2}$) Schottky contacts to n-type GaN

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Abstract

The temperature-dependent current-voltage (*I-V*) characteristics of permalloy ($Ni_{0.8}Fe_{0.2}$) Schottky contacts to n-type GaN have been investigated. Magnetization measurements revealed the ferromagnetic behavior of $Ni_{0.8}Fe_{0.2}$ film on n-type GaN. The Schottky barrier parameters, such as the barrier height and ideality factor, determined by thermionic emission depended on the measurement temperature, suggesting the presence of lateral inhomogeneity in the Schottky barrier. The experimental data modified by the thermionic emission model along with a Gaussian distribution of the barrier heights indicated the presence of a double Gaussian barrier distribution in the $Ni_{0.8}Fe_{0.2}$/n-type GaN Schottky contact. The mean barrier heights and standard deviations for each Gaussian distribution were 0.84 & 1.32 eV and 0.10 & 0.17 eV over temperature range of 125–200 K and 225–400 K, respectively. The noise spectral density of the current fluctuations measured as a function of frequency (*f*) at room temperature followed a $1/f^{\gamma}$ dependence with a γ value close to unity, irrespective of the applied forward bias. The 1/*f*-type noise was attributed to the barrier inhomogeneity existing at the $Ni_{0.8}Fe_{0.2}$/n-type GaN Schottky interface as revealed from the temperature-dependent *I–V* characteristics.

Keywords: GaN, permalloy, Schottky contact, current-voltage characteristics, low-frequency noise

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