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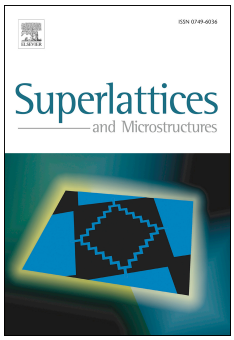


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# Optimization of Ohmic Contacts on Thick and Thin AlGaN/GaN HEMTs Structures

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**Abstract:** In this paper, we address the Ohmic contacts comparison and optimization on both thin (18 nm) and thick (25 nm) AlGaN/GaN HEMTs structures. In the conventional metallization scheme of Ti/Al/Ti/Au, several stacks based on Ni, Cr, and Pt metals replacing the middle Ti were tested and compared. Specific Contact Resistance ($\rho_c$) strongly depends on the stack ratio. For a particular, stack ratio of 1:5:2:3 tested on thick AlGaN based HEMTs, Cr stack exhibited the least $\rho_c$ value of $5x10^{-5}$ Ω-cm$^2$ while the $\rho_c$ value doubled for Pt and increased by 4 times for Ni. But the morphology comparison shows that Ni is the best choice. Therefore the Ni-based stack was further optimized for low contact resistance. In the optimization process, pre-metallization surface treatments were altered along with the stack ratios. The stack ratio of 1:5:2:2.5 has resulted in lowest specific contact resistance value of $6\times10^{-6}$ ohm-cm$^2$. Different Ni-based stacks with ratio variations were then deposited and compared for thick and thin AlGaN/GaN HEMTs structures. The same value of $\rho_c$ was recorded on both thick and thin structures as long as the Ni proportion in the stack is low. With an increase in the Ni proportion, $\rho_c$ was found to be increased dramatically for thin AlGaN/GaN HEMTs.

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