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Energy Relaxation Rate of Hot Electrons in N-Type GaN Epilayers using Heat Pulse Techniques

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Abstract: We have measured the energy relaxation rate of hot electrons in MBE grown bulk GaN epilayers on GaAs and sapphire substrates over the electron temperature range 1 - 130 K. The measurements were made using heat pulse techniques. For layers grown on GaAs substrates the results show that the carriers reside in the substrate, probably as in a GaAs/AlGaAs heterojunction. For layers grown on sapphire substrates we obtain a $P \propto T_e^4$ dependence for the relaxation rate in the low temperature limit, consistent with piezoelectric coupling in the so-called 'dirty' regime, changing to a linear dependence in the high temperature, equipartition, regime.

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