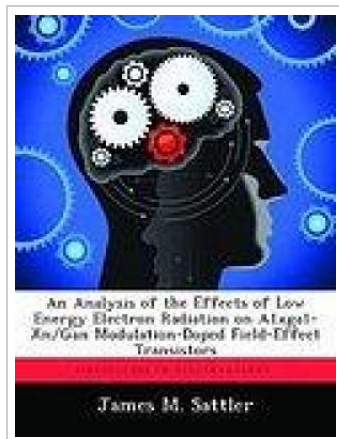




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An Analysis of the Effects of Low Energy Electron Radiation on Al_xGa_{1-x}N/GaN Modulation-Doped Field-Effect Transistors

By James M. Sattler

Biblioscholar Okt 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x9 mm. This item is printed on demand - Print on Demand Neuware - The effects of radiation on Al_xGa_{1-x}N/GaN MODFETs is an area of increasing interest to the USAF as these devices become developed and integrated in satellite-based systems. Irradiation is also a valuable tool for analyzing the quantum-level characteristics and properties that are responsible for device operation. Al_xGa_{1-x}N/GaN MODFETs were fabricated and irradiated at liquid nitrogen temperatures by 0.45 -1.2 MeV electrons up to doses of 6 10¹⁶ e /cm². Following irradiation, low temperature I-V measurements were recorded providing dose-dependent measurements. Temperature-dependent I-V measurements were also made during room temperature annealing following irradiation. I-V measurements indicate radiation-induced changes occur in these devices creating increased gate and drain currents. These increased currents are only maintained at low temperatures (T greater than 300 K). It is believed that the increase in gate current is caused by an increase in the electron trap concentration of the Al_xGa_{1-x}N layer. This increase in trap concentration directly increases the trap-assisted tunneling current resulting in the observed increase in gate current. The mechanism causing the increase in drain current is unknown. Several theories explaining this increase are...



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