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Optical and Electrical Studies of Gamma-Irradiated AlGaN/GaN High Electron Mobility Transistors ANUPAMA YADAV, ELENA FLITSIYAN, LEONID CHERNYAK, Department of Physics, University of Central Florida, Orlando, USA, SHIHYUN AHN, FAN REN, Department of Chemical Engineering, University of Florida, Gainesville, USA, STEPHEN PEARTON, Department of Materials Science and Engineering, University of Florida, Gainesville, USA, IGOR LUBOMIRSKY, SERGEY KHODOROV, Department of Materials and Interfaces, Weizmann Institute of Science, Rehovot, Israel — The impact of ^{60}Co gamma-irradiation on n-channel AlGaN/GaN High Electron Mobility Transistors (HEMTs) was studied by means of temperature dependent Cathodoluminescence (CL) and Electron Beam Induced Current (EBIC) technique. Increase in diffusion length after low dose of gamma-irradiation ($\leq$ 200 Gy) is consistent with the decrease in the CL intensity. The observed effect is explained via the mechanism involving trapping of Compton electrons on irradiation induced nitrogen vacancies. For high dose (>200 Gy), diffusion length was observed to decrease which is presumably associated with the mobility degradation. It is shown that calculated activation from the EBIC and CL measurements follows exactly the same trend, which implies that same underlying phenomenon is responsible for observed findings. In addition, DC current-voltage measurements were conducted on the devices in order to relate the material's fundamental properties to the device performance.

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