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Effect of electron irradiation on the electrical and optical characteristics of gallium-nitride light emitting diodes

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Abstract

We study the effect of electron irradiation on the electrical and optical characteristics of commercial gallium-nitride light emitting diodes in the fluence region from 10(15) to 10(17) electrons/cm². After electron irradiation, the forward-leakage current shows no significant changes, while the reverse-leakage current increases twice under the fluence 9.90 x10(16) electrons/cm². This suggests the existence of radiation damage-induced traps. The irradiation reduces the capacitance and the carrier concentration, which can be attributed to deactivation of dopant atoms. Basing on electroluminescence measurements, we prove that the luminescence intensity and the red shift of peak position increase significantly with increasing dose. The peak-wavelength shift can be attributed primarily to the radiation-induced defects that cause formation of red bands and, at the same time, gradually suppress the band-edge luminescence.


Keywords

Author Keywords: [gallium nitride](#); [light emitting diodes](#); [current-voltage characteristics](#); [capacitance-voltage characteristics](#); [electroluminescence](#)


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