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Investigation of Proton Radiation Effect on Indium Gallium Nitride Light Emitting Diodes

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Abstract

This paper investigates the effects of proton radiation on the electrical and optical properties of InGaN light-emitting diodes (LEDs). InGaN LEDs are known for their high brightness and efficiency, making them useful in various applications. However, they are vulnerable to radiation damage, which can degrade their performance over time. In this study, InGaN LEDs were exposed to proton radiation with the fluences of 1 × 1013 cm-2, 3 × 1013 cm-2 and 3 × 1014 cm-2 and their electrical and optical properties were measured before and after irradiation. Results show that proton radiation causes asignificant increase in the reverse leakage current. The light intensity also increases due to radiation. These changes are attributed to radiation-induced defects created in the LED material. The findings of this study provide important insights into the reliability and durability of InGaN LEDs in space and other radiation environments.

Author Keywords

degradation; Indium Gallium Nitride (InGaN); Light Emitting Diodes (LEDs); proton radiation

Index Keywords

Gallium alloys, Gallium nitride, III-V semiconductors, Indium alloys, Optical properties, Radiation damage, Semiconductor alloys; Electrical and optical properties, Gallium nitride light emitting diode, High brightness, Higher efficiency, Indium gallium nitride, Light emitting diode, Lightemitting diode, Proton radiation effects, Proton radiations; Light emitting diodes

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