

A review of leakage current mechanism in nitride based light emitting diode

By: Hedzi, AS (Hedzi, Anali Syahira)¹; Mirdan, N (Mirdan, Norasmahan)¹; Hasbulah, NF (Hasbulah, Nurul Fadzil)¹

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Abstract

We review the dominant mechanism and characteristics which give rise to the existence of forward and reverse leakage current in nitride based light emitting diode (LED). The existence of leakage current can affect the reliability and efficiency of LED. Hence, to understand the mechanism that is responsible for its existence, the occurrence of leakage current is divided into three main parameters: 1) low bias; 2) medium or high bias; 3) temperature dependence. For reverse bias, many reports suggest Poole-Frenkel as the dominant mechanism in low reverse bias and some others suggested the field dependent tunneling mechanism. In high reverse bias, many studies have shown tunneling to be the dominant mechanism. However, there is also a few other papers suggesting variable range hopping (VRH) or FF being a dominant mechanism. When the reverse bias current-voltage measurement below 200 K, majority studies reported VRH to be the dominant mechanism. Meanwhile, for forward bias, defect-assisted tunneling is most likely the dominant mechanism. At low forward voltages, electrons are believed to be the dominant carriers for defect assisted tunneling, while holes are reported to be likely the dominant carrier in medium forward voltages. (C) 2016 Penerbit UTM Press. All rights reserved

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Author Information

Reprint Address: Hasbulah, NF (reprint author)

✉ Int Islamic Univ Malaysia, Dept Elec & Comp Engr, Kulliyah Engr, Kuala Lumpur 53100, Malaysia.

Addresses:

✉ [1] Int Islamic Univ Malaysia, Dept Elec & Comp Engr, Kulliyah Engr, Kuala Lumpur 53100, Malaysia

Email Addresses: nfadzinh@iium.edu.my

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