Characterization of Deep Levels in AlGaN|GaN HEMT by FT-DLTS and Current DLTS

© M. Gassoumi [1,2]

[1] Research Unit Advanced Materials and Nanotechnologies, University of Kairouan,
BP 471, Kasserine 1200, Tunisia
[2] Department of Physics, College of Sciences, Qassim University,
P.O. 6644, Buryadh 51452, Saudi Arabia

E-mail: gassoumimalek@yahoo.fr

Received May 3, 2020
Revised May 3, 2020
Accepted for publication June 17, 2020

In this work, GaN|AlGaN high electron mobility transistor (HEMT) structures are investigated, grown on semi-insulating SiC substrates by molecular beam epitaxy and metal-organic chemical-vapor deposition techniques. This paper reports on the kink effect and hysteresis effect observed in AlGaN|GaN high electron mobility transistors (HEMTs) on SiC substrate. It is well known that trapping effects can limit the output power performance of microwave HEMTs, which is particularly true for the wide band gap devices. A detailed study is presented of FT-DLTS and CDLTS measurements performed on AlGaN|GaN HEMTs. It is demonstrated that the kink effect is directly correlated to shallow traps, and a remarkable correlation exists between deep levels observed by CDLTS and FT-DLTS and the presence of parasitic effects such as kink and hysteresis effects.

Keywords: AlGaN|GaN (HEMT), kink effect, hysteresis effect, FT-DLTS, CDLTS, traps.

Full text of the paper will appear in journal SEMICONDUCTORS.