P17

Optical Investigations on In$_{0.11}$Ga$_{0.89}$N based LEDs Grown on Si (111) Substrate with Different Superlattices Stack Layer Structure

E. Azimah[1], N. Zainal[1], A. Shuhaimi[2], T. Egawa[3], A.V. Akimov[4], A.J. Kent[4]

[1]Institute of Nano Optoelectronics Research and Technology (INOR), School of Physics,
Universiti Sains Malaysia, 11800 Penang, Malaysia.
[2]Department of Physics, Faculty of Science, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
[3]Research Centre for Nano-Device and System, Nagoya Institute of Technology, Gokiso-cho,
Showa-ku, Nagoya 466-8555, Japan.
[4]School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, UK.

Growing In$_x$Ga$_{1-x}$N based LEDs on Si is considered challenging as the large lattice mismatch between nitrides and Si material would lead to cracks and defects in the nitride layers. This reduces the luminescence efficiency of the devices. Therefore, in this work, we investigate the effect of the inserting different intermediate structure as an effort to reduce the defects from propagating into the multi-quantum wells (MQWs). Here, In$_{0.11}$Ga$_{0.89}$N based LEDs grown on Si (111) substrate with AlN/GaN SLS. In between the LEDs and the SLS, intermediate layers were grown in different structure and in different devices. The idea is to further minimize the impact of the defects propagation of defects and cracks into the MQWs region. We found the In$_{0.11}$Ga$_{0.89}$N based LEDs with the insertion of AlGaN/GaN SLS exhibits the best internal quantum efficiency than other devices.