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Properties of yellow band in MOVPE grown GaN layers

Nitride semiconductors became the second most important semiconductor material after silicon in the last two decades. Many daily used devices, such as blue light emitting diodes or high electron mobility transistors in electronic devices, are based on nitride semiconductors. Despite the nitride devices mass production, there are many open questions and not well understood phenomena which have to be solved.

One of the open question is the origin of different defect bands in luminescence spectra. Epitaxially grown GaN layers contain in their luminescence spectra very fast excitonic band and also different kinds of defect bands, which have mostly slow decay time. Fast decay time without any slow components is necessary for many scintillation applications. Especially defect band with the maximum emission around 2.2 eV (called yellow band) has very slow decay time (microsecond range) and needs to be suppressed in fast scintillators.

In our previous work [1], we have shown that different technological parameters during Metal Organic Vapour Phase Epitaxy (temperature, carrier gas, etc.) influence properties of yellow band quite significantly. In this work, we continue to study properties of yellow band of GaN layers grown with different parameters (different precursor and carrier gas). Photoluminescence and other measuring techniques are used for investigation of yellow band properties. Origin of yellow band will be discussed.

[1] T. Hubáček et al., J. Cryst. Growth 531 (2020) 125383.

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