Study of heterostructures grown on A-plane GaN ELO

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III-Nitrides are intensively studied since the early 90´s. They outperform classical III-V semiconductors in most of the micro-, optoelectronic applications. They are of special interest because of their wide band-gap and the strong polar nature.

These nitride semiconductors principally crystallize in the wurtzite structure and usually were grown along the C-axis. By use of R-plane sapphire, i.e. (1-102) oriented, GaN can be grown along the [11-20] direction *[1]*.

This leads to the so called A-plane GaN. Because the polar C-axis lies in the growth plane the material has fundamental different properties. For instance the Quantum Confined Stark Effect (QCSE) caused by internal fields in Quantum Wells (QW) can be annihilated by growth on A-plane GaN. These internal fields are the origin of strong polarization along the C-axis. In common C-plane GaN based optoelectronic devices the QCSE causes a reduction of the oscillator strength and a red-shift of the transition energies. In case of A-plane GaN based Quantum wells i.e. InGaN, improved optical emission properties and efficiencies can be expected *[2]*.

However publications about demonstration of improved properties of GaN-based devices when using A-plane are limited at present.
Especially the growth of material with decent microstructure quality is still difficult i.e. a huge density of stacking faults is generated in the layers *[3]*. Therefore epitaxy of A-plane GaN remains a challenge compared to materials grown on C-plane.

In our investigations we are using Epitaxial Lateral Overgrowth (ELO) *[4]* on partially masked A-plane GaN templates grown by MOVPE on R-plane sapphire. ELO technique allows filtering of a part of the defects by overgrowth on masked areas. We obtained coalesced and flat layers, but problems as bowing and step bunching still have to be solved.

Intermediate states of ELO growth will be presented and discussed concerning the mask type and mask orientation respectively. Furthermore preliminary results of photoluminescence will be showed. Finally a prospect is given for the following work.

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