InGaN/GaN quantum structures. As a result, the 4 µm ELOG sample's shortest emission wavelength can be explained by its lower amount of the residual strain [22,23], which is released at the coalescence sidewalls more compared to other samples [24]. Since this sample has more stripes, there are more coalescence sidewalls available per unit area. Thus, as a result of the increased crystal quality and the reduced residual strain, the electroabsorption performance is the strongest in the 4 µm ELOG sample compared to the reference. With the decreased levels of dislocation density and residual strain, epitaxial lateral overgrowth therefore enables strong electroabsorption in InGaN/GaN multiple quantum wells.

3. Conclusions

In conclusion, the electroabsorption performance is found superior for the ELOG InGaN/GaN quantum structures (with 4 µm ELOG mask stripes) because of its higher crystal quality and a lower level of residual strain compared to the reference without ELOG. Electroabsorption performance of this sample is much significantly stronger than those of the others, as compared to the difference measured in their PL intensities. The electroabsorption operation wavelengths are observed to follow closely their PL peak wavelengths; the same is also true for the case for their spectral widths. Here the results deduced from different and independent experiments are found in good agreement. The experimental results also indicate that the electroabsorption performance and simultaneous emission rates follow similar trends with the crystalline quality and the level of strain released in the coalescence sidewalls. ELOG, with reduced levels of dislocation density, offers an effective approach for achieving strong electroabsorption in InGaN/GaN quantum structures.

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