

Contents

Introduction and Motivation	1
1 Fundamentals	5
1.1 Heteroepitaxial growth of AlN on sapphire	5
1.2 AlN templates as UV LED base layers	9
1.3 State of research	12
2 Experimental methods	17
2.1 Sample fabrication	17
2.2 Characterisation methods	22
2.3 Method for light extraction simulations	30
3 High temperature annealing of MOVPE grown AlN	35
3.1 Annealing of 350 nm thick AlN	36
3.2 Annealing of layer thickness series	40
3.3 Variation of the annealing parameters	52
4 Nanopatterned sapphire substrates	61
4.1 Light extraction simulations of nanopatterned interface	62
4.2 Growth on sapphire nanopillars	68
4.3 Growth on sapphire nanoholes	80
5 UVC LED performance on the developed AlN templates	95
Conclusion	105
A Appendix	107
Bibliography	107
List of Publications	129
List of Figures	132