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Abstract

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Part I

BACKGROUND

Chapter 1

Introduction

A vehicle (from Latin: vehiculum [1]) is a machine that transports people or cargo. Vehicles include wagons, bicycles, motor vehicles (motorcycles, cars, trucks, buses), railed vehicles (trains, trams), watercraft (ships, boats), amphibious vehicles (screw-propelled vehicle, hovercraft), aircraft (airplanes, helicopters, aerostat) and spacecraft [2]. Land vehicles are classified broadly by what is used to apply steering and drive forces against the ground: wheeled, tracked, railed or skied. ISO 3833-1977 is the standard, also internationally used in legislation, for road vehicles types, terms and definitions. Vehicle detection and vehicle type recognition is a practical application of machine learning concepts and is directly applicable for various operations in a traffic surveillance system contributing to an intelligent traffic surveillance system. We will introduce the processing of automatic vehicle detection and recognition using static image datasets. Further using the same technique, we shall improvise vehicle detection by using live CCTV surveillance. The surveillance system includes detection of moving vehicles and recognizing them, counting number of vehicles and verification of their permit with the organization [3].

Intelligent vehicle detection and counting are becoming increasingly important in the field of highway management. However, due to the different sizes of vehicles, their detection remains a challenge that directly affects the accuracy of vehicle counts. To address this issue, this paper proposes a vision-based vehicle detection and counting system. In the proposed vehicle detection and counting system, the highway road surface in the image is first extracted and divided into a remote area; the method is crucial for improving vehicle detection. Then, the vehicle trajectories are obtained by the ORB algorithm. Finally, the above two areas are placed into the YOLOv5 network to detect the type and location of the vehicle. Several highway surveillance videos based on different scenes are used to verify the proposed methods. The experimental results verify that using the proposed segmentation method can provide higher detection accuracy, especially for the detection of small vehicle object [4].

Vehicle detection and statistics in highway monitoring video scenes are of considerable significance to intelligent traffic management and control of the highway. With the popular installation of traffic surveillance cameras, a vast database of traffic video footage has been obtained for analysis. Generally, at a high viewing angle, a more-distant road surface can be considered. The object size of the vehicle changes greatly at this viewing angle, and the detection accuracy of a small object far away from the road is low. In the face of complex camera scenes, it is essential to effectively solve the above problems and further apply them [4].

A CCTV camera is a very essential part of an intelligent traffic surveillance framework. It is simply the automated process of monitoring the traffic in a particular area and detecting vehicles for further action, as shown in the diagram. The captured images can provide valuable clues to the cops and other public essential tracking services, such as vehicle's license plate number, time and motion of vehicle, details associated with the driver, etc.. which all may lead to evidence of some crime or any unforeseen or unfortunate incidents. Earlier people used to process images manually. In fact, this system is still going on in India, whereas countries like the USA also have implemented automated machines- CCTVs that function 24x7 and take immediate action via signaling too. Manual work has always been proven slower and less efficient due to human errors and many other factors that affect living beings. Keeping these points in mind and moving with the advancement of technologies, many innovative thinkers have developed certain intelligent traffic control systems using various techniques. This research is based upon the combination of two prior-made researches by scholars whose works have been published [5].

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Chapter 2

Related Work

At present, vision-based vehicle object detection is divided into traditional machine vision methods and complex deep learning methods. Traditional machine vision methods use the motion of a vehicle to separate it from a fixed background image. This method can be divided into three categories [1]: the method of using background subtraction [2], the method of using continuous video frame difference [3], and the method of using optical flow [4]. Using the video frame difference method, the variance is calculated according to the pixel values of two or three consecutive video frames. Moreover, the moving foreground region is separated by the threshold [3]. By using this method and suppressing noise, the stopping of the vehicle can also be detected [5]. When the background image in the video is fixed, the background information is used to establish the background model. Then, each frame image is compared with the background model, and the moving object can also be segmented. The method of using optical flow can detect the motion region in the video. The generated optical flow field represents each pixel's direction of motion and pixel speed [?]. Vehicle detection methods using vehicle features, such as the Scale Invariant Feature Transform (SIFT) and Speeded Up Robust Features (SURF) methods, have been widely used. For example, 3D models have been used to complete vehicle detection and classification tasks [6]. Using the correlation curves of 3D ridges on the outer surface of the vehicle [7], the vehicles are divided into three categories: cars, SUVs, and minibuses.

The use of deep convolutional networks (CNNs) has achieved amazing success in the field of vehicle object detection. CNNs have a strong ability to learn image features and can perform multiple related tasks, such as classification and bounding box regression [8]. The detection method can be generally divided into two categories. The two-stage method generates a candidate box of the object via various algorithms and then classifies the object by a convolutional neural network. The one-stage method does not generate a candidate box but directly converts the positioning problem of the object bounding box into a regression problem for processing. In the two-stage method, Region-CNN (R-CNN) [9] uses selective region search [10] in the image. The image input to the convolutional network must be fixed-size, and the deeper structure of the network requires a long training time and consumes a large amount of storage memory. Drawing on the idea of spatial pyramid matching, SPP NET [11] allows the network to input images of various sizes and to have fixed outputs. R-FCN, FPN, and Mask RCNN have improved the feature extraction methods, feature selection, and classification capabilities of convolutional networks in different ways. Among the one-stage methods, the most important are the Single Shot Multibox Detector (SSD) [12] and You Only Look Once (YOLO) [13] frameworks. The MutiBox [14], Region Proposal Network (RPN) and multi-scale representation methods are used in SSD, which uses a default set of anchor boxes with different aspect ratios to more accurately position the object. Unlike SSD, the YOLO [13] network divides the image into a fixed number of grids. Each grid is responsible for predicting objects whose centre points are within the grid. YOLOv2 [15] added the BN (Batch Normalization) layer, which makes the network normalize the input of each layer and accelerate the network convergence speed. YOLOv2 uses a multi-scale training method to randomly select a new image size for every ten batches. Our vehicle object detection uses the YOLOv3 [16] network. Based on YOLOv2, YOLOv3 uses logistic regression for the object category. The category loss method is two-class cross-entropy loss, which can handle multiple label problems for the same object. Moreover, logistic regression is used to regress the box confidence to determine if the IOU of the a priori box and the actual box is greater than 0.5. If more than one priority box satisfies the condition, only the largest prior box of the IOU is taken. In the final object prediction, YOLOv3 uses three different scales to predict the object in the image.

The traditional machine vision method has a faster speed when detecting the vehicle but does not produce a good result when the image changes in brightness, there is periodic motion in the background, and where there are slow moving vehicles or complex scenes. Advanced CNN has achieved good results in object detection [17,18]; however, CNN is sensitive to scale changes in object detection. The one stage method uses grids to predict objects, and the grid's spatial constraints make it impossible to have higher precision with the two-stage approach, especially for small objects. The two stage method uses region of interest pooling to segment candidate regions into blocks according to given parameters, and if the candidate region is smaller than the size of the given parameters, the candidate region is padded to the size of the given parameters. In this way, the characteristic structure of a small object is destroyed and its detection accuracy is low. The existing methods do not distinguish if large and small objects belong to the same category. The same method is used to deal with the same type of object, which will also lead to inaccurate detection. The use of image pyramids or multi-scale input images can solve the above problems, although the calculation requirements are large.

Detection of specific objects in images is difficult, due to the nature of objects in images that are often of different sizes, different orientations, and overlapping objects that causes occlusion of the object of interest to be detected**?** . These problems require a detection algorithm that has several properties, such as translation invariance(invariant to different locations of object of interest in the image), rotation invariance (invariant to the rotation of the object in the image), and scale invariance (invariant to the size of the objects in the image). A common approach is to use machine learning methods that learn a representation directly from the available data to train a model. Popular Methods use low level features such as SIFT [19], HOG [20], and Haar [21] combining them with a machine learning method to classify the objects. This approach is known as the "Feature +Classifier" approach.

2.1 Vehicle Detection Work in Europe

Vision-based vehicle detection methods in Europe have achieved abundant results. In, between the “Hofolding” and “Weyern” sections of the A8 motorway in Munich, Germany, the Multivariate Alteration Detection (MAD) method was used to detect the change of two images with a short time lag. The moving vehicles are highlighted in a change image, which is used to estimate the vehicle density of the road. Using the motorways A95 and A96 near Munich, the A4 near Dresden, and the “Mittlere Ring” in Munich as the test environments, the Canny edge algorithm is applied to the road image, and the histogram of the edge steepness is calculated. Then, using the k-means algorithm, the edge steepness statistics are divided into three parts, and a closed vehicle model is detected based on the steepness. A contrast-based approach was used to create a colour model to identify and remove vehicle shadow areas, which eliminates interference caused by movement in the scene. After eliminating the shadow area, the vehicle detection performance can be significantly improved. The experiment was conducted on Italian and French highways. The HOG and Haar-like features were compared in, and the two features were merged to construct a detector for vehicle detection that was tested on French vehicle images. However, when the above method is used for vehicle detection, the type of vehicle cannot be detected. Additionally, when the illumination is insufficient, it is difficult to extract the edge of the vehicle or detect the moving car, which causes problems in low vehicle detection accuracy and affects the detection results for further use. Pictures of aerial view angles were used by but cannot clearly capture the characteristics of each car and produce false vehicle detections. Nonetheless, with the development of deep learning technology, vehicle detection based on CNN has been successfully applied in Europe.

In Fast R-CNN was used for vehicle detection in traffic scenes in the city of Karlsruhe, Germany. Fast R-CNN uses a selective search strategy to find all candidate frames, which is notably time-consuming, and the vehicle detection speed is slow. In short, research on vision-based vehicle detection is still progressing, and major challenges are gradually being overcome, which will make a significant contribution to the development of European traffic construction.

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Chapter 3

Methodology

The Architecture. Our detection network has 24 convolutional layers followed by 2 fully connected layers. Alternating 1 ×1 convolutional layers reduce the features space from preceding layers. We pretrain the convolutional layers on the ImageNet classification task at half the resolution (224 ×224 input image) and then double the resolution for detection.

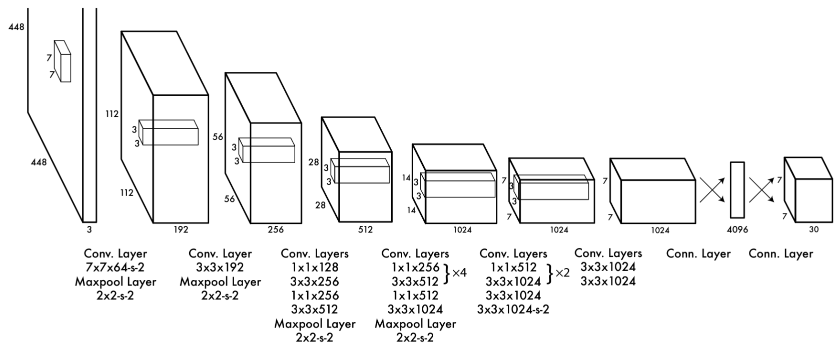

Figure 3.1. **The Architecture**. Our detection network has 24 convolutional layers followed by 2 fully connected layers. Alternating 1×1 convolutional layers reduce the features space from preceding layers. We pretrain the convolutional layers on the ImageNet classification task at half the resolution (224×224 input image) and then double the resolution for detection.

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TABLE 3.1. Experimental conditions.

Sample ID	A1	A2	A3	A4	A5	A6	A7
T_{sub} (°C)	100	110	120	130	140	150	160
Φ_{Ga} (Pa)	$1.0{\times}10^{-10}$	$1.0{\times}10^{-11}$	$1.0{\times}10^{-12}$	$1.0{\times}10^{-13}$	$1.0{\times}10^{-14}$	$1.0{\times}10^{-15}$	$1.0{\times}10^{-15}$
Q_N (sccm)	1.5	1.6	1.7	1.8	1.9	2.00	2.1

3.1.1 Subsection 3.1 of section 1 in chapter 3

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3.3 REFERENCES

Part II

Results

Chapter 4

Title of the chapter 4 displayed in the page

Author 1[1,*], Author 2[1,2,*], Author 3[3], Author 4[1], Author 5[1], Author 6[1], Author 7[2,4,#] and Author 8[1,#] *Author 1 and Author 2 contributed equally to this study.*

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DOI: 10.1038/s41598-019-55424-z

Contributions
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[1]Department X, University 1, City A, Country B. [2]Department Y, University 2, City C, Country D. [3]Institute E, City F, Country G. [4]Research Center H, University I, City J, Country K. [#]e-mail: author7@university2.ac.countryD and author8@universityI.countryK

Abstract

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4.1 Section 1 in chapter 4

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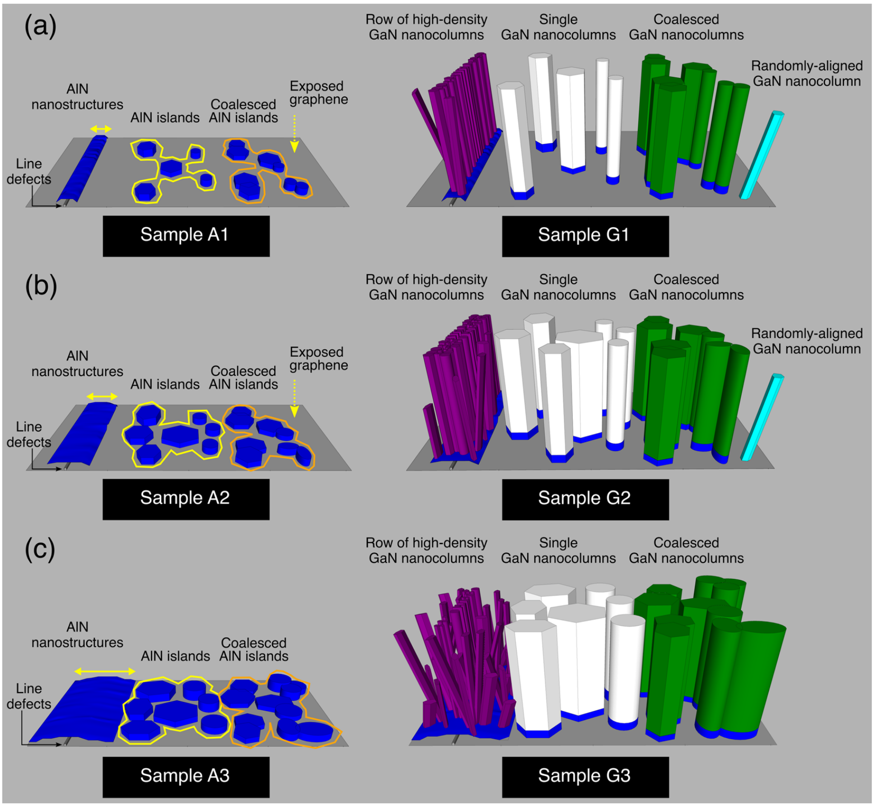

FIGURE 4.1. Simplified schematics of the AlN buffer structures and GaN nanocolumn formation on graphene. Samples (**a**) A1-G1, (**b**) A2-G2 and (**c**) A3-G3. There are two possible AlN (blue) nanostructures forming on graphene: 1) AlN islands and 2) AlN nanostructures along the line defects of graphene (the yellow arrows indicate their lateral growth spread further away from the line defects). Single (white) and coalesced (green) vertical GaN nanocolumn structures are nucleated from the AlN islands, while row of high-density nanocolumns (purple) form on the AlN nanostructures that spread from the line defects. Additional tilted nanocolumns (cyan) are likely to grow on exposed graphene (adapted with permission from ref. 4 © Liudi Mulyo *et al*, 2020.

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4.1.1 Subsection 4.1 of section 1 in chapter 4

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Chapter 5

Title of the chapter 5 displayed in the page

Author 1[1,*], Author 2[1,2,*], Author 3[3], Author 4[1], Author 5[1], Author 6[1], Author 7[2,4,#] and Author 8[1,#]

First published in: *Scientific Reports* **10**, 853 (2020).
DOI: 10.1038/s41598-019-55424-z

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[1]Department X, University 1, City A, Country B. [2]Department Y, University 2, City C, Country D. [3]Institute E, City F, Country G. [4]Research Center H, University I, City J, Country K. [#]e-mail: author7@university2.ac.countryD and author8@universityI.countryK

Abstract

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5.1 Section 1 in chapter 5

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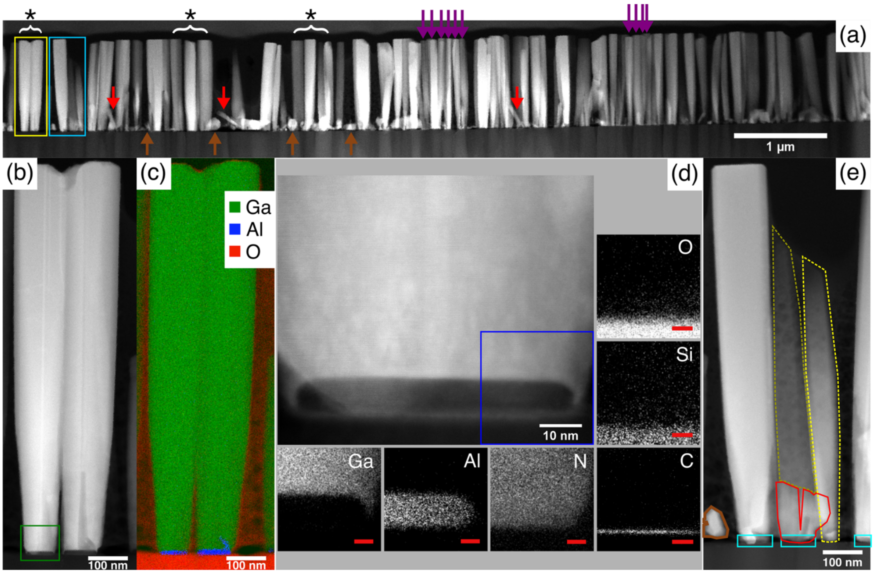

FIGURE 5.1. TEM image of GaN nanocolumn sample synthesized with nominally the same growth conditions as sample G1. (**a**) Overview cross-sectional HAADF STEM image, showing vertical GaN nanocolumns (star-marked and purple arrows), inclined GaN nanocolumns (red arrows) and GaN crystallites (brown arrows). (**b**) HAADF STEM image of two GaN nanocolumns within yellow frame in **a**. (**c**) Combined color map of the Ga (green), Al (blue) and O (red) elemental distributions (EDS/EELS) on the corresponding region in **b**. (**d**) Magnified image of the lower part of the GaN nanocolumn near the interface of the left GaN nanocolumn in **b** (green frame), with the elemental mapping near the interfaces between the GaN nanocolumn, AlN island, graphene and silica glass (blue frame) by EDS (Ga, Al, Si) and EELS (N, O, C). The red scale bars are 5 nm. (**e**) HAADF STEM image of the GaN nanocolumns that is light-blue framed in **a**. The inclined GaN nanocolumn (yellow-dashed line) is possibly directly nucleated on graphene (indicated by the absence of any AlN layer [cyan frames] at the base). There are two broken GaN nanocolumns (red framed area) sharing the same AlN island and another inclined GaN nanocolumn (dark-yellow dashed line) in the background. An irregular GaN crystallite (brown outline) likely grown directly on graphene is also observed (adapted with permission from ref. 4 © Liudi Mulyo *et al*, 2020.

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Table 5.1. Micro-Raman peak positions, intensities and ratios

Sample	Median D/G ratio	Median G		Median 2D			Median 2D/G ratio
		Position [cm^{-1}]	Intensity [cps]	Position [cm^{-1}]	Intensity [cps]	FWHM [cm^{-1}]	
DLG before MBE growth	1	2	3	4	5	6	7
DLG after MBE growth	1	2	3	4	5	6	7

5.2.1 *Subsection 5.2 of section 2 in chapter 5*

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Chapter 6

Title of the chapter 6 displayed in the page

Author 1[1,*], Author 2[1,2,*], Author 3[3], Author 4[1], Author 5[1], Author 6[1], Author 7[2,4,#] and Author 8[1,#]

First published in: *Scientific Reports* **10**, 853 (2020).
DOI: 10.1038/s41598-019-55424-z

Contributions
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[1]Department X, University 1, City A, Country B. [2]Department Y, University 2, City C, Country D. [3]Institute E, City F, Country G. [4]Research Center H, University I, City J, Country K. [#]e-mail: author7@university2.ac.countryD and author8@universityI.countryK

ABSTRACT

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6.1 SECTION 1 IN CHAPTER 6

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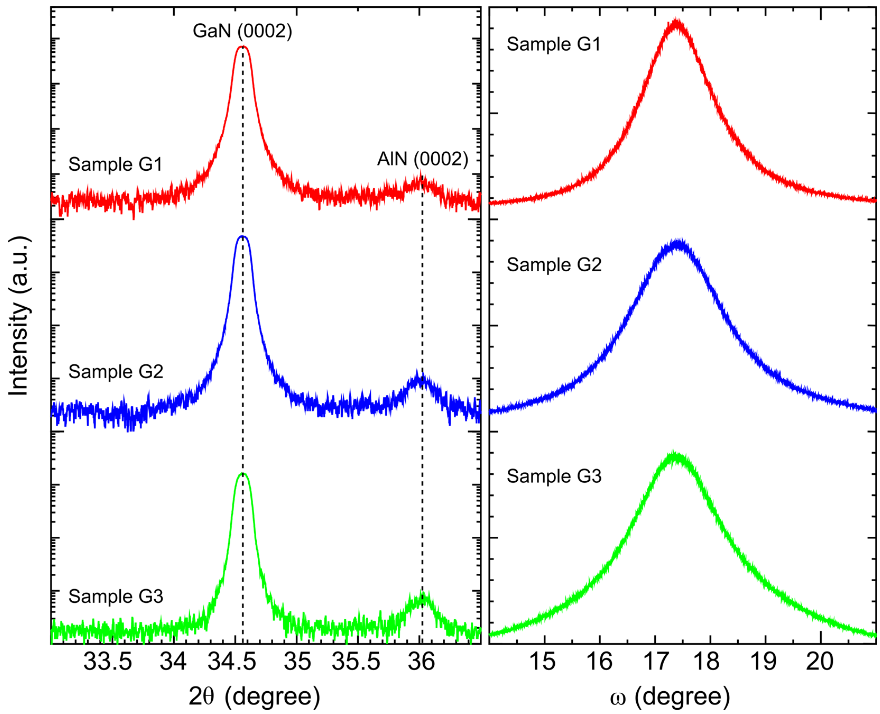

FIGURE 6.1. HRXRD measurements of the nanocolumns. (**a**) 2θ-ω scanning curve and (**b**) ω scanning curve of samples G1, G2 and G3 (adapted with permission from ref. 4 © Liudi Mulyo *et al*, 2020.

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6.1.1 *Subsection 6.1 of section 1 in chapter 6*

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6.1.2 *Subsection 6.2 of section 1 in chapter 6*

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6.2 Short section title in the chapter

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TABLE 6.1. Al-content of each axial nanocolumn segment for the vertical GaN/AlGaN nanocolumn ensemble (top to bottom) obtained from fitting the simulation model to the HRXRD 2θ-ω scan data

Segment	Thickness (nm)	Al bottom (%)	Al top (%)
p-GaN	1	2	3
p-AlGaN (linear grading)	4	5	6
i-GaN quantum disk	7	8	9
n-AlGaN (linear grading)	10	11	12
n-GaN	13	14	15
n-AlN buffer layer	16	17	18

6.2.1 *Subsection 6.2 of section 2 in chapter 6*

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6.3 References

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Part III

Epilogue

Chapter 7

Conclusion

Lorem ipsum dolor sit amet, consectetuer adipiscing elit[1]. Ut purus elit,vestibulum ut, placerat ac, adipiscing vitae, felis 1. Curabitur dictum gravidamauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque[2]. Pellentesque habitant morbi tristique senectuset netus et malesuada fames ac turpis egestas 2. Mauris ut leo. Cras viverra metusrhoncus sem[3]. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eutellus sit amet tortor gravida placerat 3. Integer sapien est, iaculis in, pretium quis,viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum[4]. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at (**??**), mollis ac, nulla. Curabitur auctorsemper nulla 4. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsaneleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum[1–6]. For Chapter 4 and Chapter 5, as well as Chapter 6

7.1 Section 1 in chapter 7

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7.1.1 Subsection 7.1 of section 1 in chapter 7

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7.1.2 Subsection 7.2 of section 1 in chapter 7

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Appendix A

Supporting information for chapter 4

A.1 Detailed growth information

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Table A.1. Detailed growth conditions of nanocolumns

Nanocolumn segment/layer	Growth temperature, pyrometer reading (°C)	Beam equivalent pressure (Pa)			Si cell temperature (°C)	N_2 flow rate/ plasma emission (sccm/mV)	Growth time (sec)
		Al	Ga	Mg			
Al seeding with Si	1	2.0×10^{-3}	-	-	4	-	5
Nitridation	6	-	-	-	-	7.00/8.9	1
n-AlN	2	3.0×10^{-4}	-	-	5	6.00/7.89	1
n-GaN	2	-	3.4×10^{-5}	-	6	7.89/1.23	4
n-$Al_{0.56}Ga_{0.78}N$	9	1.2×10^{-3}	4.0×10^{-5}	-	6	7.00/8.9	1
i-GaN	2	-	3.1×10^{-2}	-	-	3.45/6.78	9
p-$Al_{1.23}Ga_{4.56}N$	7	8.9×10^{-1}	2.0×10^{-3}	4.0×10^{-5}	-	6.00/7.89	1
p-GaN	2	-	3.0×10^{-4}	5.0×10^{-6}	-	7.00/8.9	1

A.2 References

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[6] A. Liudi Mulyo *et al.* Utilization of Graphene as Substrate and Bottom Electrode for High-Density and Vertically-Aligned GaN/AlGaN Nanocolumns. *Unpublished* (n.d). Cited on page/s A-1.

Appendix B

Supporting information for chapter 5

B.1 Additional micro-Raman spectroscopy measurements

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Table B.1. Summary of micro-Raman spectroscopy measurements for the as-grown nanocolumn sample carried out in different areas (of the same sample) from what is presented in Figure C.2. The table shows the median values of the D peak, G peak, and 2D peak, for the entire mapping (123 measurements), from the green patches (45 measurements), and from the purple areas (67 measurements).

Median value	Area (number of measurements)	Position [cm^{-1}]	Intensity [cps]	FWHM [cm^{-1}]	Intensity ratio to G peak
D peak	Green patches (45)	1	2	3	4
	Full map (123)	5	6	7	8
	Purple areas (67)	9	1	2	3
G peak (*)	Green patches (45)	4	5	-	-
	Full map (123)	6	7	-	-
	Purple areas (67)	8	9	-	-
2D peak	Green patches (45)	1	2	3	4
	Full map (123)	5	6	7	8
	Purple areas (67)	9	1	2	3
D' peak (**)	Green patches (45)	4	5	-	6

B.2 References

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Appendix C

Supplementary information for chapter 6

C.1 micro-photoluminescence spectra of HVPE-GaN and nanocolumn samples

This is an additional characterization from Subsection 6.2.1.

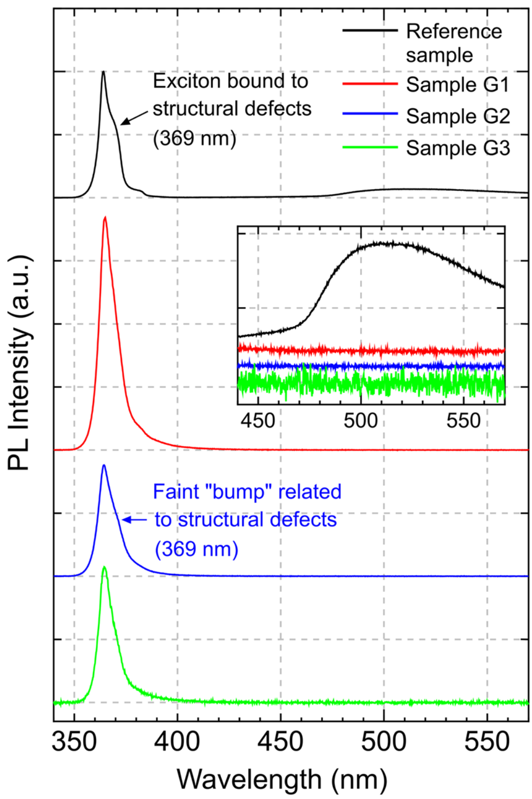

Figure C.1. RT micro-photoluminescence spectra of reference sample (HVPE-freestanding GaN), samples G1, G2 and G3. Inset shows the magnified spectra in the wavelength range from 440 to 570 nm, highlighting the presence of broad green and yellow emission band in the reference sample (adapted with permission from ref. 1 © Liudi Mulyo *et al*, 2020.

C.2 MICRO-RAMAN SPECTRA OF PRISTINE GRAPHENE AND NANOCOLUMN SAMPLES AFTER GROWTH

This is an extra measurement from subsection 6.2.1

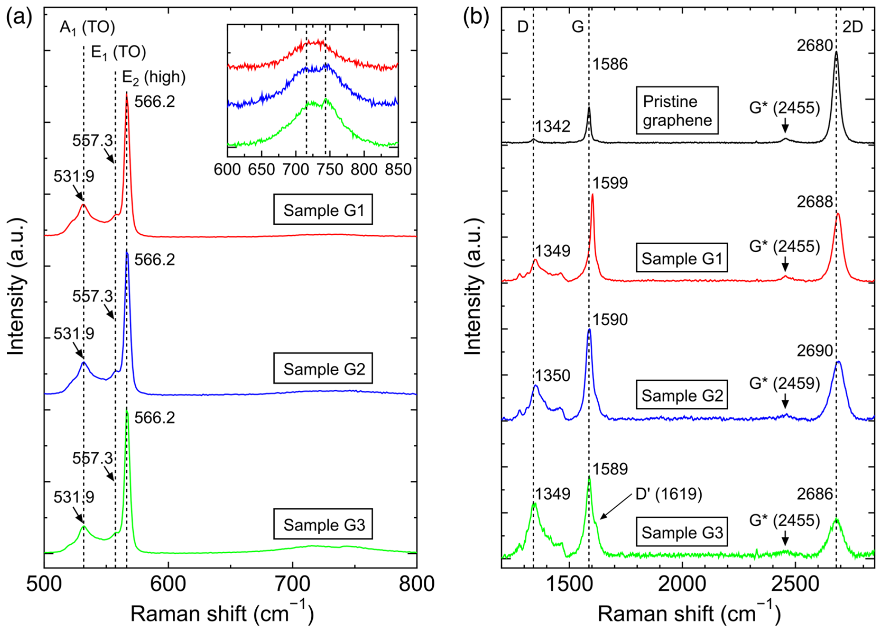

FIGURE C.2. Micro-Raman spectroscopy of the nanocolumn samples, including the graphene for each respective sample. Raman spectra of (**a**) samples G1, G2 and G3 between 500 and 800 cm^{-1}, with the peak frequencies of the A_1 (TO), E_1 (TO) and E_2 (high) modes indicated by vertical dashed lines (inset: magnification from 600 to 850 cm^{-1}, with the identified peak frequencies at 715 and 743 cm^{-1} of the possible SO and LPP modes, respectively[2,3], indicated by vertical dashed lines), and (**b**) pristine graphene, samples G1, G2 and G3 between 1100 and 3200 cm^{-1}. The dashed lines indicate D, G and 2D peak positions of pristine graphene (adapted with permission from ref. 1 © Liudi Mulyo *et al*, 2020.

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Curriculum vitae

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- NorFab travel grant for MBE 2016 and CSW 2017 — 2017-2018
- NorFab project support, for research visit in University X — 2018-2019
- PhD scholarship, NTNU — 2017-2021

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- Skilled for material characterization techniques using scanning electron microscopy, photoluminescence, and Raman spectroscopy.
- Familiar with device fabrication tools, including mask/maskless aligner, e-beam/sputter deposition, plasma-enhanced chemical vapor deposition, wet etching, and inductively-coupled plasma reactive ion etching.
- Basic knowledge of e-beam lithography and X-ray diffraction.

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[2] **Author 1**, Author 2, Author 3, Author 4, Author 5, Author 6, and Author 7. Title of paper 2. *Nanotechnology* **30** (1), 015604 (2018).
*This article was chosen as **cover image/featured article**, see Figure D.1.*

[3] Author 1*, **Author 2***, Author 3, Author 4, Author 5, Author 6, Author 7, and Author 8. Title of paper 3. *Nano Letters* **19** (3), 1649-1658 (2019).
***equal contributions**

[4] **Author 1**, Author 2, Author 3, Author 4, Author 5, and Author 6. Title of paper 4. *Scientific Reports* **10**, 853 (2020).

Manuscript under review

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*equal contributions

FIGURE D.1. Our work published in Nanotechnology was selected as a cover image/featured article for the first issue of 2019 (4 January).

CONFERENCE PARTICIPATION (PRESENTATIONS)

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[1] **Author 1**†, Author 2, Author 3, Author 4, Author 5, and Author 6. *Title of the conference*. Contributed talk at The 11th International Symposium on Semiconductor Light Emitting Devices (ISSLED 2017), Banff, Canada, October 08-12 2017.

[2] Author 1†, **Author 2**, Author 3, Author 4, Author 5, and Author 6. *Title of the conference*. Contributed talk at Nano@NTNU Symposium, Trondheim, Norway, December 06-07 2017.

[3] **Author 1**†, Author 2, Author 3, Author 4, Author 5, and Author 6. *Title of the conference*. Poster presentation at Nano@NTNU Symposium, Trondheim, Norway, December 06-07 2017.
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[4] Author 1†, **Author 2**, Author 3, Author 4, Author 5, Author 6, Author 7, and Author 8. *Title of the conference*. Contributed talk at Nanowire Week, Hamilton, Canada, June 11-15 2018.

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[6] **Author 1**, Author 2, Author 3, Author 4, Author 5, Author 6†, and Author 7. *Title of the conference*. Poster presentation at The International Workshop on Nitride Semiconductors, Kanazawa, Japan, November 11-16 2018.

[7] **Author 1**†, Author 2, Author 3, Author 4, Author 5, Author 6, and Author 7. *Title of the conference*. Contributed talk at The 10th annual workshop of Norwegian PhD Network on Nanotechnology for Microsystems, Tromsø, Norway, June 17-19 2019.

[8] **Author 1**, Author 2, Author 3, Author 4, Author 5, and Author 6†. *Title of the conference*. Poster presentation at The 13th International Conferences on Nitride Semiconductors, Bellevue, Washington (Seattle), USA, July 07-12 2019.

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dictum, 20, 28, 36, 45, A-1, A-5

egestas, 20, 28, 36, 45, A-1, A-5

Lorem, 20, 28, 36, 45, A-1, A-5

purus, 20, 28, 36, 45, A-1, A-5

Colophon

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