

# GUIDELINES FOR THE PREPARATION OF RESEARCH REPORTS, DISSERTATIONS AND THESES

Faculty of Science  
Universiti Malaya

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The conventional format follows the traditional monograph structure. This is the most common form of research project/dissertation/thesis used by most candidates.

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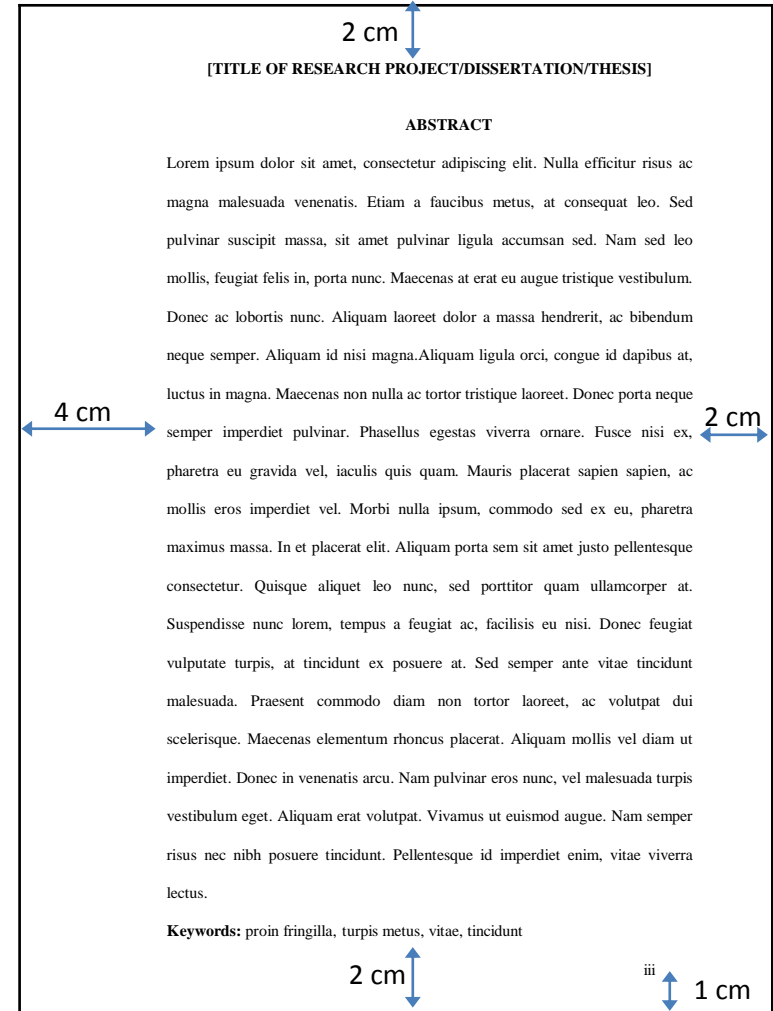
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# ABSTRACT

- Is a short summary of the research project/dissertation/thesis.
- Should briefly describe the objectives (problem statement), the significance of research, research methodology, as well as the findings and conclusion of the research.
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## Examples 1: Abstract

### NOVEL DNA-BASED ELECTRONIC PROFILING METHOD FOR SELECTED ALGAE

#### ABSTRACT

The utilization of deoxyribonucleic acid (DNA) in electronics has become significant and gradually accepted by researchers due to its remarkable characteristics. There are several devices and sensors that employ DNA in their fabrication process. The standard methods to detect and recognize any species of living organism are polymerase chain reaction (PCR), sequencing and microarray techniques. However, there are several drawbacks pertaining to these methods such as sample contamination, misleading results as well as being costly and involving complicated procedures. As an alternative method, this study presents a simple, fast, high sensitivity and economical novel identification method for algae-derived DNA using the electronic properties of DNA. Novel current-voltage (I-V) characteristics of chosen algal species using DNA-specific diodes were obtained and its corresponding diode parameters (turn-on voltage, shunt and series resistance, knee voltage, breakdown voltage as well as breakdown current) were then calculated in this study. Each algal species exhibits specific turn-on voltage values for example *Chlorella* sp. had a value of 1.40 V, *Synechococcus* sp. with 1.15 V and *Amphora* sp. with 1.36 V. This novel technique demonstrates an exciting potential that may have huge impact in various fields, especially in pathology and taxonomy.

**Keywords:** Indium tin oxide, DNA, Schottky diode, biosensor, diode parameters.

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### NOVEL DNA-BASED ELECTRONIC PROFILING METHOD FOR SELECTED ALGAE

#### ABSTRAK

Penggunaan asid deoksiribonukleik (DNA) dalam elektronik menjadi lebih penting dan semakin diterima pada masa kini oleh penyelidik kerana ciri-cirinya yang luar biasa. Terdapat beberapa peranti dan pengesan yang menggunakan DNA dalam proses fabrikasinya. Kebanyakan kaedah piawai untuk mengesan dan mengenali mana-mana spesies organisma hidup adalah reaksi berantai polymerase (PCR), teknik penjujukan dan teknik microarray. Sebaliknya terdapat beberapa kekurangan berkaitan kaedah tersebut seperti pencemaran sampel, keputusan mengelirukan serta mahal dan prosedur yang rumit. Sebagai kaedah alternatif, tesis ini membentangkan kaedah pengenalpastian baru yang mudah, cepat, sensitiviti tinggi dan praktikal digunakan untuk DNA yang berasal dari alga yang menggunakan sifat-sifat elektronik DNA. Ciri-ciri arus voltan (I-V) spesies alga yang terpilih menggunakan diod khusus DNA ditunjukkan dan parameter diod yang berkenaan (voltan putar, peredaran dan rintangan siri, voltan lutut, voltan kerosakan serta arus pecahan) kemudian dikira dalam kajian ini. Setiap spesies alga menunjukkan nilai voltan pemula yang khusus seperti *Chlorella* sp. mempunyai nilai 1.40 V, *Synechococcus* sp. dengan 1.15 V dan *Amphora* sp. dengan 1.36 V. Teknik novel ini mungkin mempunyai impak yang besar dalam pelbagai bidang, terutamanya dalam patologi dan taksonomi.

**Kata kunci:** Indium tin oksida, DNA, diod Schottky, pengesan bio, parameter diod.

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## Examples 2: Abstract

### USING SINGLE DISH TELESCOPE TO OBSERVE 21-cm HI SPECTRUM LINE TOWARDS SEVERAL GALAXY CLUSTERS

#### ABSTRACT

Clusters of galaxies are a good probe to study the cosmological parameters as they are the largest gravitationally-collapsed structures in the universe. They are also known to contain a large amount of dark matter, whose origin is still a mystery. In this thesis, implications on galaxy clusters structure and evolution are investigated by probing into galaxy clusters using a single dish radio observations of the 21-cm line of neutral hydrogen. Several candidates were chosen for this thesis, e.g. A262, A569, A426 and A1367. The morphological types of galaxies within these galaxy clusters are studied in order to investigate the HI distribution in them. This will lead to important understanding of the distribution of virial mass and hence total mass distribution of those clusters and thus origin and evolution of HI in galaxy clusters can be investigated. Several other cosmological implications such as dark matter and merging processes in galaxy clusters are also studied in this thesis. It is found that morphological types of galaxies within the clusters play a very important role in understanding the clusters' evolution, dark matter distribution and merger processes.

**Keywords:** Cosmology, galaxy clusters: neutral hydrogen (HI), merger, morphology, dark matter.

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### MENGGUNAKAN TELESKOP PIRING PARABOLA UNTUK MENCERAP GARIS SPEKTRUM HI 21-cm KE ARAH BEBERAPA KLUSTER GALAKSI

#### ABSTRAK

Kluster galaksi merupakan penyiasatan yang baik untuk mengkaji parameter kosmologi kerana mereka adalah struktur graviti-runtuh yang terbesar di alam semesta. Mereka juga diketahui mengandungi sejumlah besar jirim gelap, yang asal-usulnya masih misteri. Dalam tesis ini, implikasi terhadap struktur dan evolusi dan kluster galaksi disiasat dengan menggunakan pemerhatian radio hidrogen neutral berjarak gelombang 21 cm. Beberapa calon telah dipilih untuk tesis ini, contohnya A262, A569, A426 dan A1367. Jenis morfologi galaksi dalam kluster galaksi ini dikaji untuk menyiasat taburan HI di dalamnya. Ini akan membawa kepada pemahaman penting dalam taburan jisim virial dan juga jumlah taburan jisim kluster-kluster dan seterusnya asal usul evolusi HI dalam kluster galaksi boleh disiasat. Beberapa implikasi kosmologi lain seperti jirim gelap dan proses penggabungan dalam kluster galaksi juga dikaji dalam tesis ini. Didapati bahawa jenis morfologi galaksi dalam kluster memainkan peranan yang amat penting dalam memahami evolusi kluster galaksi, taburan jirim gelap dan proses penggabungan.

**Kata kunci:** Kosmologi, Kluster galaksi: hidrogen neutral (HI), penggabungan, morfologi, jirim gelap.

iv



## Examples 3: Abstract

### USING SINGLE DISH TELESCOPE TO OBSERVE 21-cm HI SPECTRUM LINE TOWARDS SEVERAL GALAXY CLUSTERS

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Clusters of galaxies are a good probe to study the cosmological parameters as they are the largest gravitationally-collapsed structures in the universe. They are also known to contain a large amount of dark matter, whose origin is still a mystery. In this thesis, implications on galaxy clusters structure and evolution are investigated by probing into galaxy clusters using a single dish radio observations of the 21-cm line of neutral hydrogen. Several candidates were chosen for this thesis, e.g. A262, A569, A426 and A1367. The morphological types of galaxies within these galaxy clusters are studied in order to investigate the HI distribution in them. This will lead to important understanding of the distribution of virial mass and hence total mass distribution of those clusters and thus origin and evolution of HI in galaxy clusters can be investigated. Several other cosmological implications such as dark matter and merging processes in galaxy clusters are also studied in this thesis. It is found that morphological types of galaxies within the clusters play a very important role in understanding the clusters' evolution, dark matter distribution and merger processes.

**Keywords:** Cosmology, galaxy clusters: neutral hydrogen (HI), merger, morphology, dark matter.

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**Kata kunci:** Kosmologi, Kluster galaksi: hidrogen neutral (HI), penggabungan, morfologi, jirim gelap.

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# ACKNOWLEDGEMENT

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- Most research projects, dissertations or theses include a message to convey appreciation to those who have been involved and provided their assistance directly or indirectly in the preparation of the study.
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## ACKNOWLEDGEMENTS

↔ First of all, I thank Allah the Almighty for all His providence in carrying out this work successfully.

I would like to express my deepest gratitude to my supervisors Dr. Rozalina Zakaria and Dr. Woon Kai Lin for guidance, support, patience and encouragement throughout the course of this work.

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Also, my warm thanks to my fellow labmates in for the stimulating discussions, for the struggle we have in working together before deadlines and for all the fun we have had. Special thanks to Noor Azrina Talik and Khairus Syifa Hamdan for all the helps and supports.

Last but not least, my sense of gratitude to one and all, who directly or indirectly have lent their hand in this venture.

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### 2.1 Topic 1

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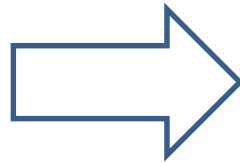


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- Using Draw table. Insert four (4) rows.
  - 1<sup>st</sup> row – Figure/ Table/ Appendices with numbers.
  - 2<sup>nd</sup> row – double dot
  - 3<sup>rd</sup> row – Title of the caption
  - 4<sup>th</sup> row – page numbers
- Then hide the line table.

# LIST OF SYMBOLS AND ABBREVIATIONS

LIST OF SYMBOLS AND ABBREVIATIONS		
<i>E<sub>a</sub></i>	:	activation energy
<i>σ</i>	:	conductivity
<i>η</i>	:	efficiency
<i>R<sub>Ω</sub></i>	:	electrolyte resistance
<i>f</i>	:	frequency
<i>T<sub>g</sub></i>	:	glass transition temperature
<i>R<sub>ct</sub></i>	:	interfacial charge-transfer resistance
<i>V<sub>oc</sub></i>	:	open circuit voltage
<i>J<sub>sc</sub></i>	:	photocurrent
<i>n</i>	:	power law exponent
<i>τ</i>	:	relaxation time
<i>ζ</i>	:	zeta potential
C	:	capacitance
C.I	:	carbonyl index
DSSC	:	dye-sensitized solar cell
EP	:	electrode polarization
FF	:	fill factor
PSSE	:	polymeric solid state electrolytes
R	:	resistance
TSC	:	total solid content
W	:	Warburg impedance

- Alphabetical order.
- List down the symbols (*italic*) than follow by abbreviations.
- Double spacing.



# LIST OF APPENDICES

## Example: List of Appendices

LIST OF APPENDICES		
Appendix A	: Observation of A569 and S7.....	144
Appendix B	: Manual from the Jodrell Bank Observatory 7-m Radio Telescope.....	146
Appendix C	: Comparison of the S7 Integrated Spectrum with the Standard Value.....	148
Appendix D	: Drawspec Tutorial.....	150
Appendix E	: Stellar Mass of Galaxies in Galaxy Cluster.....	156

- List of appendices should be used alphabet.
- Single spacing for same appendix but double spacing for the next appendix.

# MAIN BODY

Candidates and supervisors should ensure that the text follows the agreed conventions of the individual faculty. The main text in the research project/dissertation/thesis must be organised following the guidelines as mentioned below:

- Text must be organised in titled chapters.
- The titles must reflect the content of the chapter.
- Every chapter must begin on a new page.
- Chapters can be divided into sub-chapters with corresponding sub-titles.
- Titles and sub-titles must be numbered.

Generally, a research project/dissertation/thesis will have the following basic structure:

- **INTRODUCTION**
- **LITERATURE REVIEW**
- **METHODOLOGY**
- **RESULTS**
- **DISCUSSION**
- **CONCLUSION**
- **REFERENCES**

## CHAPTER 1: INTRODUCTION

Tab should  
be 0.5 cm

### 1.1 Introduction

↔ When the size of a matter is reduced from bulk to the nanometer scale, the new properties will emerge. These significant new properties, such as optical, electronic, surface and structural properties make nano-size particles are manipulated for various applications such as signal amplifications, light trapping in light emitting device, light guiding and focusing, sensors, and a lot more.

Since 1908, scientist has figured out the existence of surface plasmons (Gaspar et al., 2013) which occurs when light (electromagnetic wave) strikes on noble metal nanoparticles and results in collective oscillation of free electrons. Noble metals such as gold (Au) and silver (Ag) is denoted as plasma in Drude-Lorentz model because it contains equal numbers of positive ion (fixed in positions) and conductive electrons (free and highly mobile). However, silver was chosen in this work since it is cheaper compared to gold.

Manufacturers are looking for simple, time and cost effective technique that can produce nanoparticles easily. Scientist has found that a process called dewetting occurred when the thin liquid film on the substrate ruptured due to application of heat and formed droplets.

### 1.2 Motivations and Objectives

The objectives of the research work presented in this thesis are:

1. to study the influence of size and thickness of silver nanoparticles towards the optical properties.
2. to verify the compatibility between the simulation and experimental's result.

- Chapter titles should be typed with capital letters and centred between the left and right margins.
- Each chapter must begin on a new page.
- Chapters and subchapters should be also titled.
- Titles should be typed in bold without underline.

# REFERENCE CITATIONS IN TEXT

Require the following information:

- last name of the author,
- the year of publication,
- the page number for the reference (direct quotes only).

- For direct quotations or paraphrases in text:

- Single author: Bernard (2002)
- Two authors: Thomas & Peter (1994)
- More than 2 authors: Wegener et al. (1994)

- For summaries the author in text:

- Single author: (Bernard, 2001)
- Two authors: (Thomas & Peter, 1994)
- More than 2 authors: (Wegener et al., 1994)
- Several authors in a sentence: (Bernard, 2002; Karnes et al., (2001); Thomas & Peter, 1994))
- If the authors have a similar surname more than one can put a, b or c.
- Example: (Wang et al., 1994a; Wang et al., 1994b)

**Example 1: Reference Citation in Text** - For direct quotations or paraphrases in text

**Single author**

Irregularities discussed by Miralda-Escude (1991) and Nakamura et. al. (1995)

from the analysis of gravitational lensing clusters, had found that the distribution of the gravitational mass (i.e. the mass of all constituents) is not spherically symmetric but in actual fact has multiple peaks. Smail et al. (1995) for instance had discovered a misalignment between the different components in A2219. This was investigated using a gravitational lens model with the superposition of a spherical and an elliptical part.

**Several authors in a sentence**

Explanation using simulations could give some clues for these discrepancies. Simulations done by several investigators have led to the evident conclusion that the irregularities are caused by the diversity of merger events. An example by Roettiger et al. (1993) shows that the hot gas follows the dark matter even after the merging of two clusters. Other findings by Evrard (1990), Schindler & Muller (1993) and Shindler & Böhringer (1993) had demonstrated that substructure of gas would disappear more quickly than substructure of dark matter during the merger of two clusters. As a result, structure differences should not be related to the radial concentration only. Furthermore, the structure and evolution of galaxy clusters should not be merely confined to the discussion from the optical, X-ray or lensing observations. Thus, the HI

**Two authors**

## Example 2: Reference Citation in Text - For summaries the author in text

More than  
two authors

Single author

Only insert  
authors  
surname

Several  
authors in a  
sentence

metal wires (Reyes et al., 2016). Recently, biomolecules like self-assembled proteins, viruses, bacteria etc. have emerged as fascinating bio-templates due to their sophisticated chemistries and special structural features, which are advantageous and beneficial characteristics for novel sub-micron to nanoscale material development (Gazit, 2007; Niu et al., 2007). Bio-template synthesis involves the use of biological building blocks as biological tools, templates and scaffolds for fabricating various non-biological nanostructures (Taton, 2003). Among these bio-templates, DNA molecules hold much importance as a template from the material science point of view. Seeman et al. (1998) reported that complementary DNA strands possessed specific recognition which allowed their arrangement into well-arranged structures at nanoscale. The polynucleotide chain of DNA has a length of 0.34 nm per nucleoside subunit and a diameter of 2 nm. Moreover, DNA molecules are chemically robust and due to their increased demand in molecular biology applications, the cost of synthesis of DNA has significantly reduced. It has been reported in literature that DNA-templated metallic nanowires tend to have different structural properties from nanowires fabricated by other techniques (Gu et al., 2005). These characteristics of DNA make them an interesting nanomaterial and bio-template for fabrication of metal structures.

RNA and DNA molecules have many common structural properties and RNA has been studied as a bio-template (Eber et al., 2015; Kumar & Gupta, 2017; Tsukamoto, Muraoka et al., 2007). However, no work on the RNA templated fabrication of metal wires has been reported before.

Two authors

Among various metal NPs, Ag NPs have exhibited the most effective light trapping potential due to their strong light scattering and surface plasmon strength (Gaspar et al., 2013). In addition, SPR absorption spectra of silver nanoparticles (Ag NPs) can be controlled from 300 (ultraviolet (UV)) to 1200 nm (near-infrared (NIR)) (Chen et al., 2012; Rycenga et al., 2011). The ability of metal NPs for SPR effect depends on its dielectric function  $\epsilon$  including a real part  $\epsilon_r$  and an imaginary part  $\epsilon_i$ , both of which vary with excitation wavelength  $\lambda$ . (Rycenga et al., 2011) The SPR effect of metal NPs with spherical structure can be described using the extinction (absorption + scattering) cross-section based on Mie theory (Mulvaney, 1996),

$$C_{ext} = \frac{24\pi^2 R^3 \epsilon_m^{\frac{3}{2}}}{\lambda} \left[ \frac{\epsilon_i}{(\epsilon_r + 2\epsilon_m)^2 + \epsilon_i^2} \right] \quad (2.2)$$

where  $C_{ext}$  is the extinction cross-section,  $R$  is the NP radius, and  $\epsilon_m$  is the relative dielectric constant of the matrix surrounding the metal NPs. This equation implies that dielectric properties have strong effect on the interaction between light and metal NPs.

In addition, the SP strength (or damping) of metal NPs can be expressed using the quality factor ( $QF$ ) (Ru & Etchegoin, 2009),

$$QF = \frac{w(\frac{d\epsilon_r}{d\omega})}{2(\epsilon_i)^2} \quad (2.3)$$

SP strength is proportional to QF. Specifically, high QF indicates strong plasmons and low QF means weak SP with a small  $C_{ext}$ . Ag has higher QF than do other metals over the spectrum from 300 to 1200 nm. Interband transitions (IBTs), which are excitations of electrons from the conduction band to higher energy levels, are key factor for the SP strength. (Perner et al., 1997) In Ag, these transitions occur at much higher energies

• Used Equation Editor.

• symbol

All symbol should be *italic*.

• Equation must be numbered and written in bracket.  
• The first number should be corresponded to the chapter's number.

• symbol

## CHAPTER 5: DISCUSSION

- Scientific name

### 5.1 Genome of *Planococcus versutus* strain L10.15<sup>T</sup>

The genome of *Planococcus versutus* strain L10.15<sup>T</sup> includes two plasmids. In pPS15-2, a putative RepB family plasmid replication initiator protein gene (WP\_049694148.1) was identified, which is a common occurrence among the plasmids of cold-active bacteria (Dziewit & Bartosik, 2014). A BLASTn search using the pPS15-2 nucleotide sequence against the NCBI non-redundant nucleotide database revealed that the sequence of pPS15-2 is very similar to plasmid sequences from *P. antarcticus* DSM 14505<sup>T</sup> (pPA05-1 and pPA05-2), *P. kocurii* ATCC 43650<sup>T</sup> (unnamed plasmid), and *P. citreus* DSM 20549<sup>T</sup> (pNM11). However, both the PGAP pipeline and RAST analysis indicated that pPS15-2 encoded 12 proteins, of which 11 are hypothetical proteins with unknown function. The only known protein is a phage integrase, that facilitates site-specific DNA recombination, suggesting the possibility of viral origin for pPA05-2, and the possibility of this plasmid to integrate into the chromosome. For pPA05-1, the BLASTn search against the NCBI non-redundant nucleotide database revealed that this plasmid was closely matched with the chromosome of *Planococcus* sp. PAMC 21323, *P. kocurii* ATCC 43650<sup>T</sup>, and *P. citreus* DSM 20549<sup>T</sup>. The annotation result revealed the presence of multiple DNA recombination proteins including resolvase, recombinase, tyrosine recombinase XerC, and mobile element protein. Even though pPA05-1 did not match any plasmid sequences from *Planococcus* sp., the BLASTn search indicated that pPA05-1 has high similarity with plasmids from *Staphylococcus aureus* strain 1128105 (p1128105) and *S. aureus* strain 1 (pSA8589). This suggests a possibility that DNA acquisition events have occurred in numerous *Planococcus* species with plasmids closely related with pPA05-1, and these have become stably integrated into the chromosome of these bacterial strains. Similar to pPA05-2, most of the genes carried by pPA05-1 are not well-

All scientific name should be *italic*.

- Scientific name

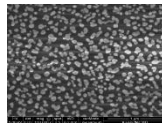


# FIGURES

Figures, like tables are printed within the body of the text at the centre of the frame and labelled according to the chapter in which they appear. Thus, for example, figures in Chapter 3 are numbered sequentially: Figure 3.1, Figure 3.2.

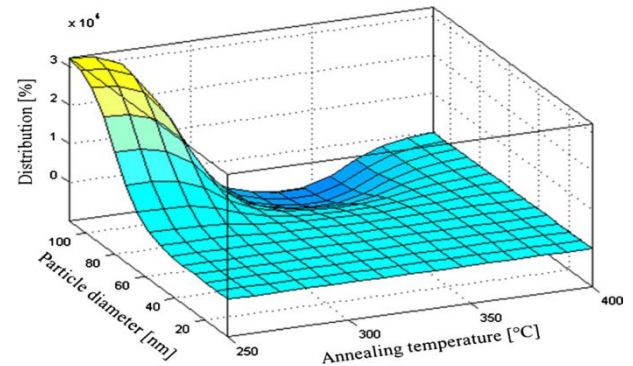
Figures, unlike text or tables, contain graphs, illustrations or photographs and their labels are placed at the **bottom** of the figure rather than at the top.

If the figure occupies more than one page, the continued figure on the following page should indicate that it is a continuation: for example:

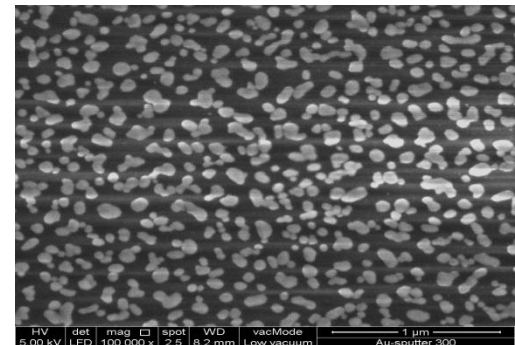


**Figure 3.2, continued.**

If the figure contains a citation, the source of the reference should be placed after the label.

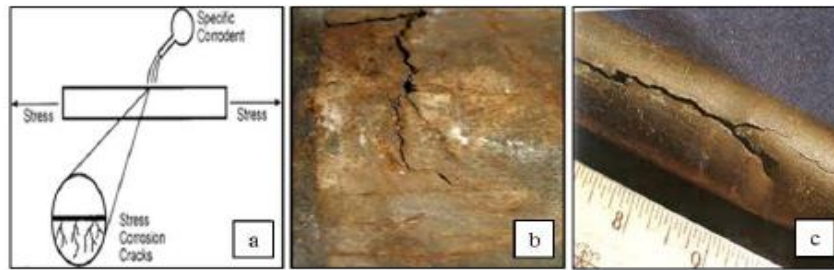


**Figure 3.1: ANFIS prediction of distribution of different sizes of granular structures at certain annealing temperature. (Copyright permission from Elsevier)**



**Figure 3.2: FESEM image of gold nanoparticles.**

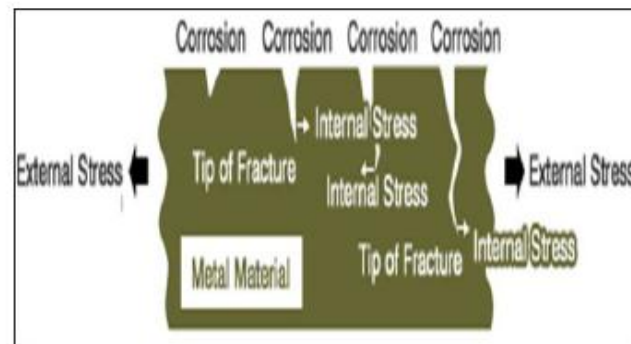
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**Figure 2.3: Stress corrosion cracking (Photo sourced from [www.corrosion-doctors.com](http://www.corrosion-doctors.com)).**

#### 2.2.2.4 Fatigue Corrosion

Fatigue corrosion, a type of stress corrosion, occurs due to the effect of cyclic stress in an environment that is corrosive. For instance, in response to being folded and straightened numerous times, a wire will eventually break, as the metal becomes fatigued. As shown in Figure 2.4, fracture occurs due to the increasing stress associated with the repetitive bending.



**Figure 2.4: The general mechanism of fatigue corrosion (Photo sourced from [www.misumi-techcentral.com](http://www.misumi-techcentral.com)).**

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- References (authors)/
- Citation report graphic is derived from/
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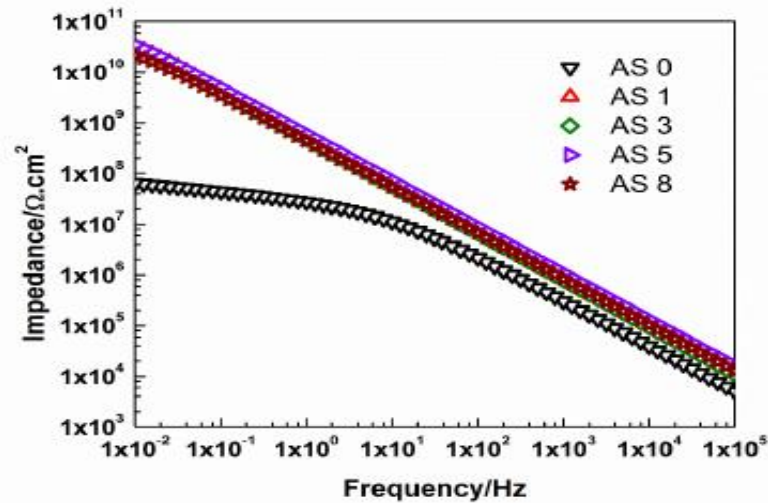


Figure 4.12: Bode plots for AS 0 and all prepared SiO<sub>2</sub> nanocomposite coating systems after 1 day of immersion time.

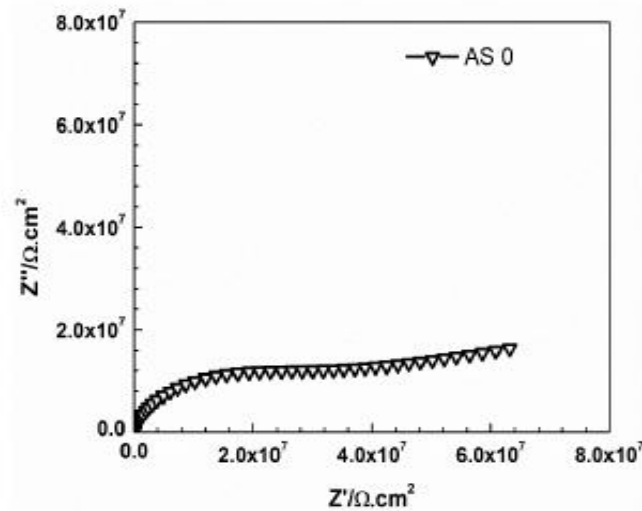


Figure 4.13: Nyquist plot for AS 0 coating system after 1 day of immersion time.

- All bold
- If caption one line centered

# TABLES

Tables are printed within the body of the text at the centre of the frame (one line) justified (if more than one line) and labelled according to the chapter in which they appear. Thus, for example, tables in Chapter 3 are numbered sequentially: Table 3.1, Table 3.2 and so on.

The caption should be placed **above** the table itself (Table 3.1). If the table contains a citation, the source of the reference should be included in the table caption.

If the table occupies more than one page, the continued table on the following page should indicate that it is a continuation, for example: ‘Table 3.1, continued.’. The header row should also be repeated.

**Table 3.1: Example of table.**

Heading	Heading
1	Text
2	Text
3	Text

85

**Table 3.1, continued.**

Heading	Heading
4	Text
5	Text
6	Text

86

**Table 3.2: Parameters of DSSCs for GPE samples in the system.**

Heading	Heading
System 1	Text
System 2	Text
System 3	Text

- All bold
- If caption one line centered

**Table 3.1: Specification of acrylic polyol resin.**

<b>Specification property</b>	<b>Value</b>	<b>Unit of measurement</b>
Product name	Desmophen A 870 BA	
Non-volatiles (Solid content wt. %)	70 ± 1	%
Hydroxyl content	2.95 ± 0.15	%
Viscosity at 23 °C	3500 ± 700	mPa.s
Density at 20 °C	1.09	g/ml
Solvent	Butyl acetate	

**Table 4.1: Contact angles values of A 100, AS 0 and all prepared SiO<sub>2</sub> nanocomposite coating systems.**

<b>System</b>	<b>Contact angle (θ°)</b>
A 100	52.3 ± 0.9
AS 0	78.5 ± 0.7
AS 1	95.3 ± 0.3
AS 3	97.3 ± 0.4
AS 5	93.7 ± 1.1
AS 8	90.6 ± 0.3

- All bold
- If caption more than one line should be justified

# FOOTNOTES

There are differences in the use of footnotes in various disciplines. For example, footnotes are commonly used in Social Sciences but rarely in Science and Technology. However candidates are advised to limit the use of footnotes unless they are proved necessary to the document. Footnotes are used to elaborate or provide additional information regarding matters discussed in that page.

Footnotes are recorded using Arabic numeric and numbered consecutively. Raised superscript numerals in the text refer to explanatory notes and documented sources appearing either at the bottom of the page as footnotes or at the end of the thesis as endnotes in a notes section. The advantage of using notes is that explanatory type of information can be presented along with source citations on the same page or place.

Footnotes should use a smaller font than the text (font size 8).

When using footnote, a number formatted in superscript is inserted following the punctuation mark in the text. Footnotes should be placed at the bottom of the page on which they appear. Please refer to the faculty for the recommended convention for writing of footnotes.

Scientists examined, over several years, the fossilized remains of the woolly-wooly yak.<sup>1</sup>

---

<sup>1</sup> While the method of examination for the woolly-wooly yak provides important insights to this research, this document does not focus on this particular species.

**Example of footnote (Source: IPS).**

# REFERENCES

- All works or studies referred to in the research report/dissertation/thesis in the form of quotations or citations must be included in the references.
- The references should be written consistently in the American Psychological Association (APA) format or in another format approved by the Faculty Science.
- Each reference should be written in single spacing format and a double space between references.
- The list of references must be arranged in alphabetical order and the entries should not be numbered. The list must also have a hanging indentation of 0.5 inch.

# REFERENCES

## Examples

Aberle, A. G. (2009). Thin-film solar cells. *Thin Solid Films*, 517(17), 4706-4710.

Al-Hinai, M. N., Hassanien, R., Wright, N. G., Horsfall, A. B., Houlton, A., & Horrocks, B. R. (2013). Networks of DNA-templated palladium nanowires: structural and electrical characterisation and their use as hydrogen gas sensors. *Faraday Discussions*, 164, 71-91.

Bergmann, P.G. (1993). Relativity. In *The new encyclopedia Britannica* (Vol. 26, pp. 501-508). Chicago, NA: Encyclopaedia Britannica.

Blakers, D. C. (1997). *Polymer lattices: Science and technology – Second edition, Volume 2: Types of lattices*. London, UK: Chapman & Hall.

Domb, A. J., Kost, J., & Wiseman, S. (1998). *Handbook of Biodegradable Polymers*. (A. J. Domb, J. Kost, D. M. Wiseman (Eds.)). The Netherlands, NL: Harwood Academic Publishers.

Griep, M. H., & Martin, J. (2012). *Damage tolerant bio-sensitized solar cells*. Presented in 12<sup>th</sup> IEEE International Conference on Nanotechnology (IEEE-NANO), 20-23 August 2012, Birmingham, United Kingdom.

Grunlan, M. A., Xing, L.-L., & Glass, J. E. (1997). Waterborne coating with an emphasis on synthetic aspects: An overview. In J. E. Glass (Ed), *Technology for Waterborne Coatings* (pp. 1-26), ACS Symposium Series 663.

Gundongu, S.O. (2012). *The characterization of some methacrylate and acrylate homopolymers, copolymers and fibers via direct pyrolysis mass spectroscopy*. (Doctoral dissertation). Retrieved on 23 May 2019 from <http://etd.lib.metu.edu>.

Jackson, P., Hariskos, D., Lotter, E., Paetel, S., Wuerz, R., Menner, R., ... Powalla, M. (2011). New world record efficiency for Cu (In, Ga) Se<sub>2</sub> thin-film solar cells beyond 20%. *Progress in Photovoltaics: Research and Applications*, 19(7), 894-897.

Levinson, D. & Ember, M. (1996). *Encyclopaedia of cultural anthropology* (Vols. 1-4). New York, NY: Henry Holt.

Lunenberg, F. C. (2008). *Writing a successful theses or dissertation: Tips and strategies for students in the social and behavioural sciences*. Thousand Oaks, CA: Corwin Press.

Nayan, N., & Sasaki, K. (2016). Absolute densities of Cu, Zn, Sn and S atoms in magnetron sputtering plasmas employing a Cu<sub>2</sub>ZnSnS<sub>4</sub> target. *Japanese Journal of Applied Physics*, 55(2), Article#07L02.

Rogoff, B. (1985). Memory development in cultural context. In M. Pressley & C. J. Brainerd (Eds.), *Cognitive learning and memory in children* (pp. 177-142). New York: Springer-Verlag.



Santini, S. N. (2008). *Research methods for business: A skill building approach*. (unpublished master's thesis). University of Malaya, Kuala Lumpur, Malaysia.

Thuau, D., Abbas, M., Wantz, G., Hirsch, L., Dufour, I., & Ayela, C. (2016). Piezoelectric polymer gated OFET: Cutting-edge electro-mechanical transducer for organic MEMS-based sensors. *Scientific Reports*, 6, Article#38672.

Yeshchenko, O. A., Dmitruk, I. M., Alexeenko, A. A., Losytskyy, Y. M., Kotko, A. V., & Pinchuk, A. O. (2009). Size-dependent surface-plasmon-enhanced photoluminescence from silver nanoparticles embedded in silica. *Physical Review B*, 79, Article#235438.

Zhao, M., Zuo, X., Wang, C., Xiao, X., Liu, J., & Nan, J. (2016). Preparation and performance of the polyethylene-supported polyvinylidene fluoride/cellulose acetate butyrate/nano-SiO<sub>2</sub> particles blended gel polymer electrolyte. *Ionics*, 22(11), 2123-2132.

Zhou, C., Lu, X., Xin, Z., Liu, J., & Zhang, Y. (2014a). Polybenzoxazine/SiO<sub>2</sub> nanocomposite coatings for corrosion protection of mild steel. *Corrosion Science*, 80, 269-275.

Zhou, S., Wu, L., Sun, J., & Shen, W. (2014b). The change of the properties of acrylic-based polyurethane via addition of nano-silica. *Progress in Organic Coatings*, 45(1), 33-42.

## LIST OF PUBLICATIONS AND PAPERS PRESENTED

### List of publications

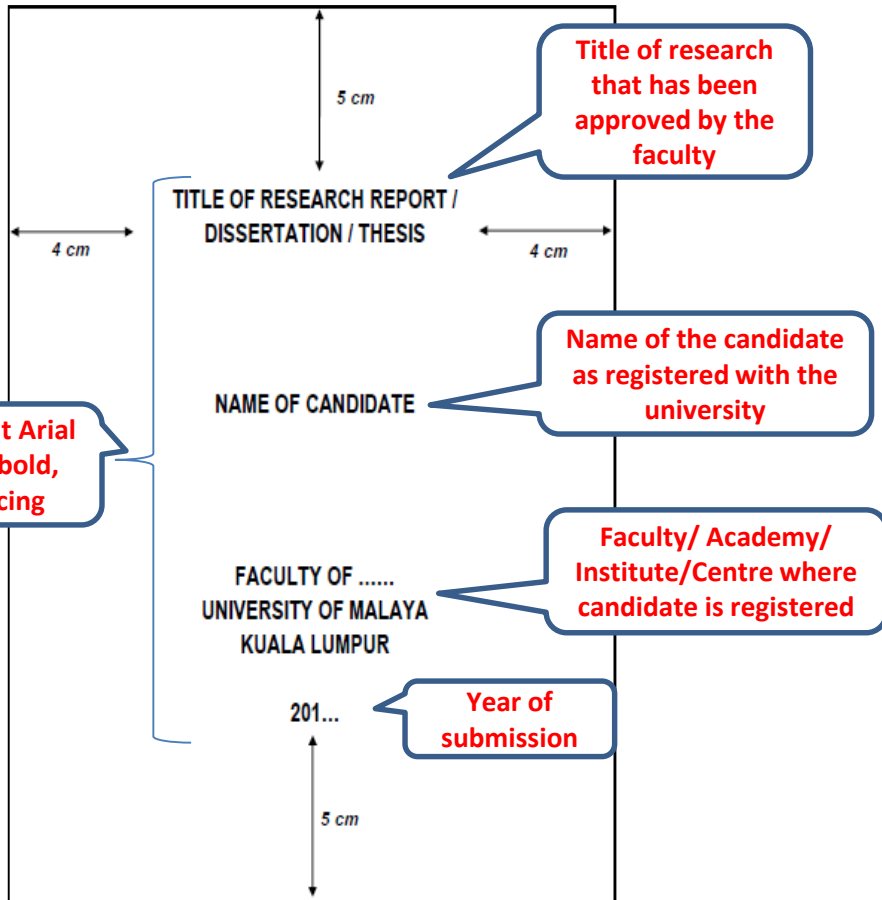
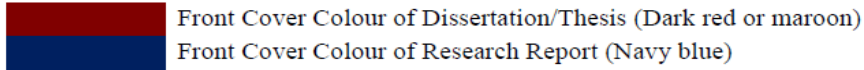
1. Shakir, S., Abd-ur-Rehman, H.M., Yunus, K., Moi P.S., Iwamoto, M., & Periasamy, V. (2018). Fabrication of un-doped and magnesium doped TiO<sub>2</sub> films by aerosol assisted chemical vapor deposition for dye sensitized solar cells. *Journal of Alloys and Compounds*, 737, 740-747.
2. Shakir, S., Saravanan, J., Rizan, N., Babu, K. J., Aziz, M. A., Moi, P. S., Periasamy, V., & Kumar, G. G. (2017). Fabrication of capillary force induced DNA template Ag nanopatterns for sensitive and selective enzyme-free glucose sensors. *Sensors and Actuators B: Chemical*, 256, 820-827.
3. Shakir, S., Yüing Y. F., Rizan, N., Abd-ur-Rehman, H. M., Yunus, K., Moi P. S., & Periasamy, V. (2017). Electro-catalytic and structural studies of DNA templated gold wires on platinum/TiO<sub>2</sub> as modified counter electrode in dye sensitized solar cells. *Journal of Material Science; Materials in Electronics*, 29(6), 4602-4611.

### Papers Presented

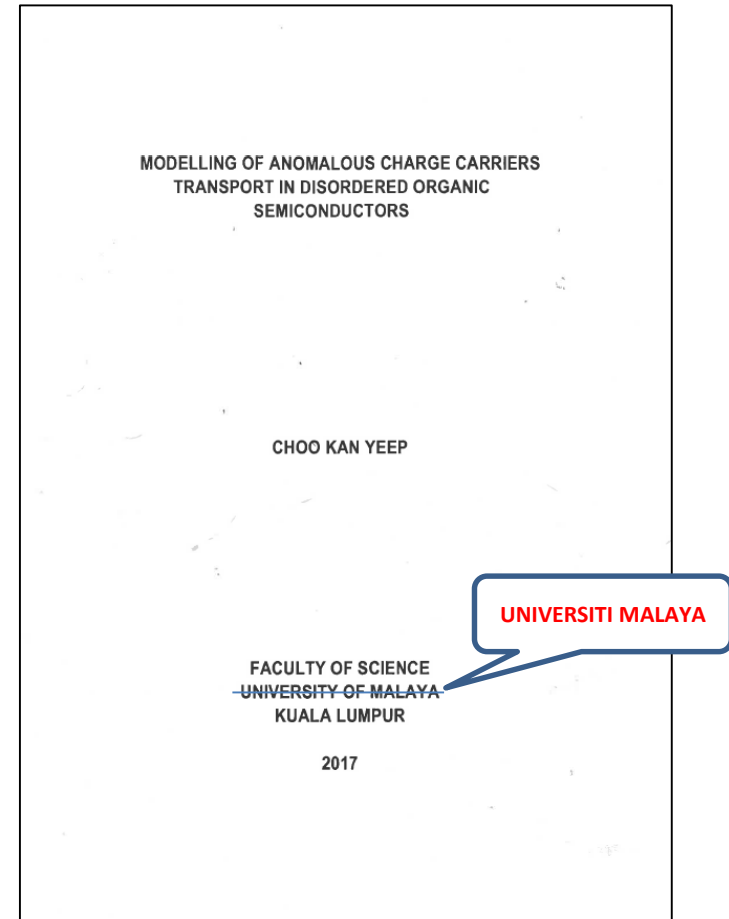
1. Shakir, S., Yunus, K., & Vengadesh, P. (2017). *Electrochemical properties of RNA templated Au nanowires to be used as a counter electrode in dye sensitized solar cells*. Paper presented at the 6th International Conference on Functional Materials and Devices (ICFMD), 15-18 August 2017, Melaka, Malaysia.

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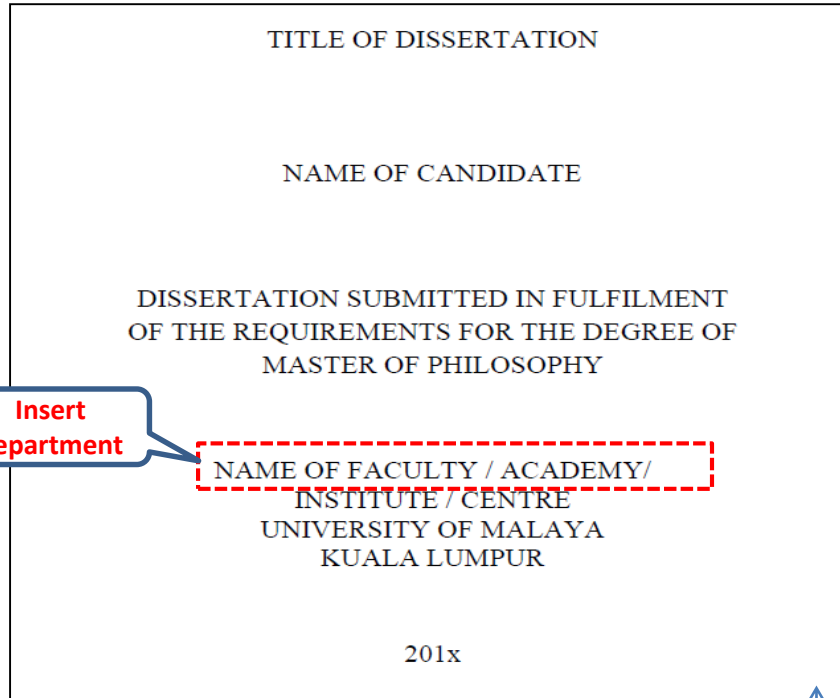


## Example: Hard Cover



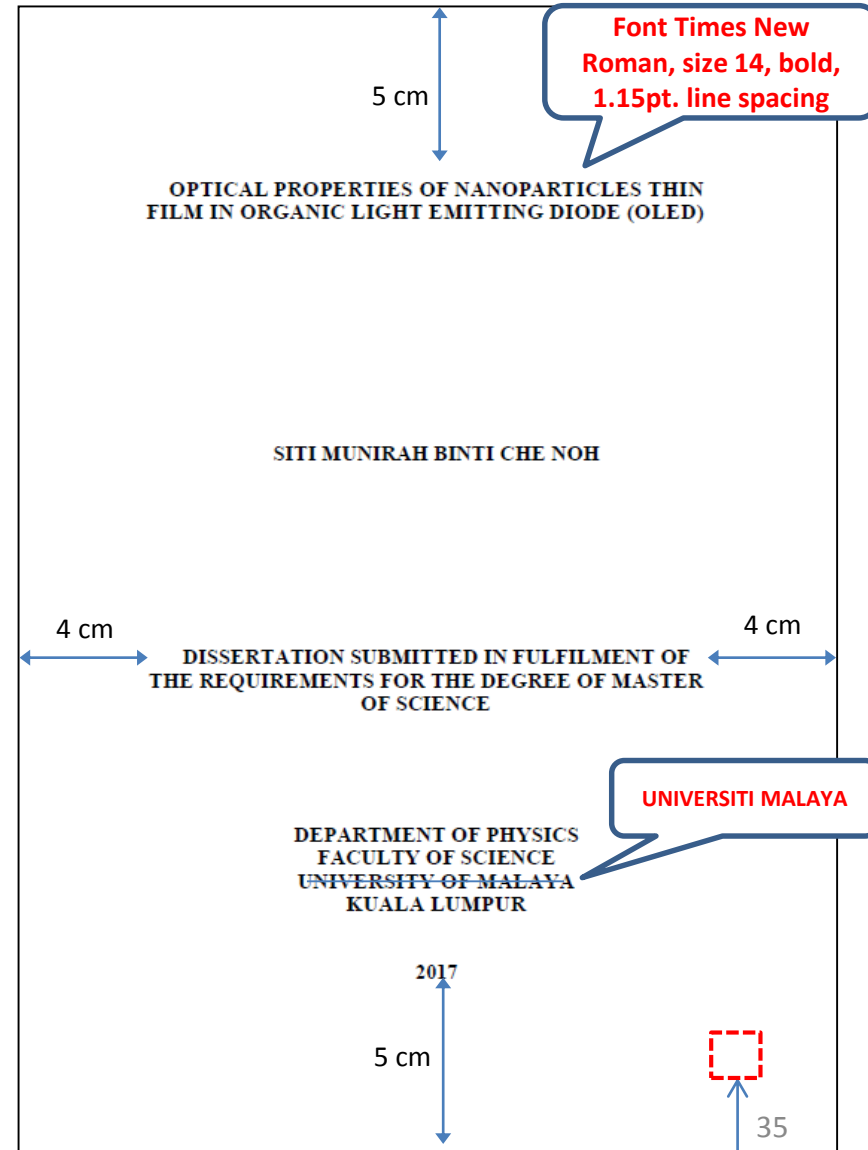
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## Example of the Title Page of a Dissertation (Research Mode):



Title page start with roman numbering 'i' but should not appear in this pages. Just blank this part.

## Example 1: Title Page



# TITLE PAGE

## Example of the Title Page of a Thesis (Research Mode):

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THESIS SUBMITTED IN FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF DOCTOR  
OF PHILOSOPHY/MEDICINE

**Insert  
department**

NAME OF FACULTY / ACADEMY /  
INSTITUTE / CENTRE  
UNIVERSITY OF MALAYA  
KUALA LUMPUR

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## Example 2: Title Page

5 cm

Font Times New Roman, size 16, bold, 1.15pt. line spacing

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CARRIERS TRANSPORT IN DISORDERED ORGANIC  
SEMICONDUCTORS

4 cm

CHOO KAN YEAP

4 cm

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REQUIREMENTS FOR THE DEGREE OF DOCTOR OF  
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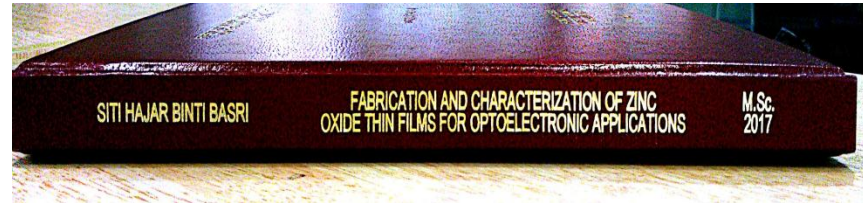
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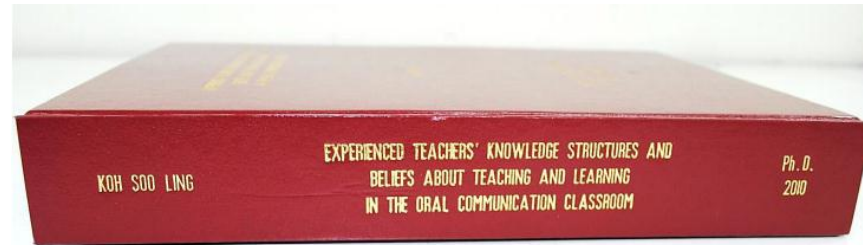
# SPINE FORMAT



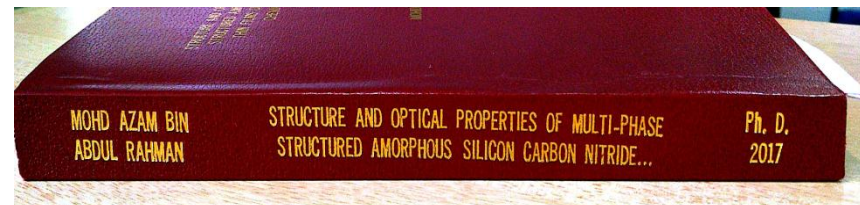
**Example 1: Spine Format for Master**



**Example 2: Spine Format for Ph.D**



**If the title is too long use 3 dot**



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