

THESIS

**A PERSPECTIVE ON USING ORGANIC MOLECULES
COMPOSING CARBON DOTS FOR CANCER
TREATMENT**



BY

MUSBAHU ADAM AHMAD

NIM. 082014253012

PROGRAM OF STUDY

**MASTER OF CHEMISTRY FACULTY OF SCIENCE AND
TECHNOLOGY, UNIVERSITAS AIRLANGGA**

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Carbon Dots For Cancer Treatment**

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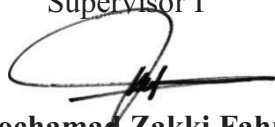
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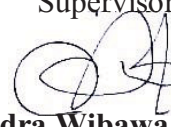
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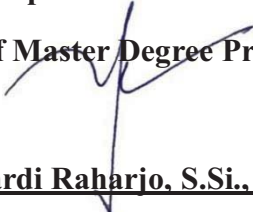


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I solemnly declare that this thesis is original of my own production and that, it is not the result of imitation or plagiarism of the work of others. This thesis has never been submitted for an academic degree and that the thesis is not exposed to opinions that have been written or published by others, unless in writing as it is clearly stated in the bibliography. Thus, I make this statement consciously and without coercion from any party, if this statement is not true, then I am willing to receive sanctions in accordance with the norms and regulations that apply at the Airlangga University

Surabaya, June 18, 2022



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Ahmad, Musbahu, 2022, A Perspective on Using Organic Molecules Composing Carbon Dots for Cancer Treatment, this thesis is under the guidance of Mochamad Zakki Fahmi PhD and Satya Candra Wibawa Sakti. Departemen Kimia, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya

ABSTRACT

Fluorescent Carbon dots (CDs) derived from biologically active sources showed enhanced activity. With their prominent potentiality, these small sized (<10nm) nanomaterials could be easily synthesized from organic sources either by top-down, bottom-up or even green approach. Their sources could influence the functional groups that would be attached at the CDs surfaces. For CDs having N, P or S dopings, the starting materials should possess the desired heteroatoms. Due to the robust functionalizations on these CDs, interaction with different kinds of receptors could enhance their cellular interactability. As such we reviewed the ability of CDs derived from different sources and their inhibition ability towards cancer cell lines like MCF-7, MDA-MB-231, HeLa, etc. The selective cytotoxic nature of some of the CDs towards cancer cell lines suggests the role of surface functional groups towards selective interaction to overexpressed proteins that is characteristic of cancer cell lines. Therefore, the CDs might be necessary alternatives to current cancer treatments that are expensive coupled with numerous side effects.

Keywords: Carbon dots; Cancer; Nanomaterials; Organic Molecules; Selectivity.

Ahmad, Musbahu, 2022, A Perspective on Using Organic Molecules Composing Carbon Dots for Cancer Treatment, skripsi ini dibawah bimbingan Mochamad Zakki Fahmi PhD dan Satya Candra Wibawa Sakti, PhD. Departemen Kimia, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

ABSTRAK

Karbon dots (CD) yang berasal dari sumber aktif biologis menunjukkan peningkatan aktivitas. Dengan potensinya yang menonjol, nanomaterial berukuran kecil (<10nm) ini dapat disintesis secara mudah dari sumber organik baik dengan pendekatan top-down, bottom-up atau bahkan hijau. Sumber mereka dapat mempengaruhi kelompok fungsional yang akan terpasang di permukaan CD. Untuk CD yang memiliki doping N, P atau S, bahan awal harus memiliki heteroatom yang diinginkan. Karena fungsionalisasi yang kuat pada CD ini, interaksi dengan berbagai jenis reseptor dapat meningkatkan interaksi seluler mereka. Dengan demikian kami meninjau kemampuan CD yang berasal dari sumber yang berbeda dan kemampuan penghambatan mereka terhadap garis sel kanker seperti MCF-7, MDA-MB-231, HeLa, dll. Sifat sitotoksik selektif dari beberapa CD terhadap garis sel kanker menunjukkan peran kelompok fungsional permukaan terhadap interaksi selektif terhadap protein yang diekspresikan secara berlebihan yang merupakan karakteristik garis sel kanker. Oleh karena itu, CD mungkin merupakan alternatif yang diperlukan untuk perawatan kanker saat ini yang mahal ditambah dengan banyak efek samping.

Kata Kunci: Titik Karbon; Kanker; Bahan Nano; Senyawa Organik; Selektivitas.

TABLE OF CONTENTS

COVER PAGE.....	i
TITLE PAGE.....	ii
DECLARATION.....	iii
ACKNOWLEDGEMENT.....	iv
ORIGINAL STATEMENT.....	vi
ABSTRACT.....	vii
ABSTRAK.....	viii
TABLE OF CONTENTS.....	ix
TABLE OF FIGURES.....	xi
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Research Objectives	4
1.4 Research Benefits.....	4
CHAPTER 2 LITERATURE REVIEW	6
2.1 Carbon Dots	6
2.1.1 Applications of Carbon dots	6
2.1.2 CDs As Cancer Agents	7
2.1.3 CDs Synthesis Methods.....	9
2.1.4 CDs Characterization Methods.....	10
2.1.5 Anticancer Assays	19
2.2 Cancer	21
2.2.1 Classification Of Tumors	22
2.2.2 Nomenclature Of Tumors	23
2.2.3 Carcinogenesis And Carcinogens.....	24
2.2.4 Tumor Targeting	27
2.2.5 Common Targets in Chemotherapy.....	30

CHAPTER 3 CONCEPTUAL FRAMEWORK AND HYPOTHESIS.....	35
3.1 Conceptual Framework	35
3.2 Hypothesis	38
CHAPTER 4 MATERIALS AND METHODS	39
CHAPTER 5 RESULTS AND DISCUSSION	41
5.1 Advances In Carbon Dots Synthesis	41
5.1.1 Top-Down Approach.....	42
5.1.2 Bottom-Up Approach.....	43
5.1.3 Green Synthesis Approach	44
5.2 Design of The Carbon Dots Based on Low Molecular Weight (LMW) Organic Molecules	45
5.3 Design The Carbon Dots Based on Large Molecular Weight (LaMW) Organic Molecules	48
5.4 Advantages Of Organic Molecule Based Carbon Dots for Cancer Treatment	50
5.4.1 Selective Interaction of Carbon dots with Cancer Cells.....	56
CHAPTER 6 CONCLUSION AND FUTURE PERSPECTIVE.....	60
6.1 Conclusion.....	60
6.2 Future Perspectives	60
REFERENCES.....	62

TABLE OF FIGURES

Fig. 2.1 Schematic description of DLS (Mourdikoudis et al., 2018).....	11
Fig. 2.2 Raman spectra of green synthesized CDs from <i>T. bispinosa</i> (Mewada et al., 2013).....	12
Fig. 2.3 FTIR spectra of catechin (green line) and Cat-CDs (red line) (Kwee et al., 2020).....	13
Fig. 2.4 (A) XPS spectrum of N-CDs (B-D) HR C1s, O1s, and N1s peaks of the N-CDs (Liu et al., 2017).....	15
Fig. 2.5 UV-Visible Spectra of Cat-CDs (Kwee et al., 2020).....	16
Fig. 2.6 PL Spectra of Cat-CDs (green line) and Catechin (blue line) (Kwee et al., 2020).....	18
Fig. 2.7 Various kinds of tumor shapes (Underwood, 2004).....	19
Fig. 3.1 Conceptual Framework.....	34
Fig. 4.1 Flowchart of Articles Selection.....	38
Fig. 5.1 Representation of fluorescent CDs from ginger extract for the inhibition of HepG2 (Li et al., 2014).....	46
Fig. 5.2 Representation of fluorescent CDs for cell imaging and treatment of the cancer cell with NIR light (Meena et al., 2019).....	47
Fig. 5.3 Representation of the synthesis of Polydopamine-Folate Carbon dots (PFCDs) for the imaging guided PPT targeting of prostate cancer cells (Phan et al.,	

2019).....	48
Fig. 5.4 Representation of the Nitrogen/Phosphorus-doped Carbon dots (NPCDs) for B16F10 melanoma cancer cell inhibition(Bajpai et al., 2020).....	49
Scheme 1. Carbon dots developed from different sources with anticancer activity.....	50