

UNIVERSITI TEKNOLOGI MARA

**[THESIS TITLE]
EFFECTS OF CLOVE ESSENTIAL
OIL AND ZEIN NANOPARTICLES
TOWARDS IMPROVING FOOD
FILM PACKAGING**

NIK NURILYA NAZLIN BT NIK LAH

Beng.

July 2018

ABSTRACT

Food packaging is importance for manufacturer in order to accomplish consumers demand for fresh, convenient and flavorful food demands (John et al., 2014). There is lack of study towards the optical and solvent casting effect on the composition of the film at various concentration of active component used in order to synthesis the film. Furthermore the food packaging with the adequate UV protection barrier are important to protect the food from subjected to the chemical reaction with the present of the UV light. Food packaging also need to have adequate degradation properties in order to ease the decomposition process during the waste treatment. In this study, food packaging using the clove essential oil and zein powder were prepared using the solvent casting method.

The film was prepared using solvent casting at several temperature 20°C, 35°C and 90°C. UV-vis and FTIR were used to characterize the effect of temperature and concentration of CLO on film packaging. The functional group that exist in the food packaging film and the film solution was investigate to observe the chemical interaction occur during the solvent casting process and the influence of the clove essential oil towards the functional group using Fourier Transform Infra-Red (FTIR) over the range of 4000 and 515 cm⁻¹. The influence of the essential oil concentration towards the optical properties of the film is studied using the UV-vis spectrometer. The results was compared with the wavelength of the UVA, UVB and UVC. The degradation of the films was studied using a batch reactor under the aerobic condition. The film was subjected towards the FTIR after degradation and the weight of the residue of the film was recorded.

It was found that increasing of CLO increased the UV-barrier properties and also lowering the degradation rate.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my Bachelor and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Madam Fatma Abd Karim.

My appreciation goes to the UiTM Shah Alam and all of the lab technician who provided the facilities and assistance during sampling. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to the loving memory of my very dear late father and mother for the vision and determination to educate me. This piece of victory is dedicated to both of you. Alhamdulillah.

TABLE OF CONTENT

	Page
AUTHOR'S DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENT	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF SYMBOLS	x
LIST OF ABBREVIATIONS	xi
LIST OF NOMENCLATURE	xii
CHAPTER ONE INTRODUCTION	1
1.1 Research Background	1
1.2 Problem statement	3
1.3 Objectives	3
1.4 Scope of Research	3
1.5 Significance of Study	4
CHAPTER TWO LITERATURE REVIEW	5
2.1 Introduction	5
2.2 Synthesis	5
2.3 Nanotechnology	6
2.3.1 Nanoparticle	6
2.3.2 Clove essential Oil (CLO)	10
2.3.3 The Base of the Film	15
2.4 Characteristic of the film packaging	17
2.4.1 Physical and mechanical test	17
2.5 Application of Nanoparticle	18

CHAPTER ONE

INTRODUCTION

1.1 Research Background

Food is the daily life needs by human and in depth scientific definition, food is the substance that living things consume for their energy and also nutrient. Food industry is an industry with acceptable estimation of growth since human population is increasing and also their need for food.

Food packaging more concern to protect the food from unwanted material such as fly, fungi and dust. In the production view, food packaging is also used and design as a way to attract potential customer to buy their product. Food packaging can comes in many form such as can, bags, film, containers or wrapper. A lot of researcher is making their way to find cheaper, biodegradable and also satisfying mechanical performance of the food packaging with enhance properties using many means of knowledge.

Film is use to protect and preserve food quality and it can be flexible than can which make it customizable to fit the consumer needs (David, 2013). Food packaging films is used as cereal box liners, bangs for bread, frozen food or snacks and food wrappers. Most of the commercialize food film packaging using petroleum based of film which make it non-biodegrade and promote the increasing of the volume of the waste in the landfill over the time.

Food film packaging consists of two major part which are the base usually used is starch and also additive in this case essential oil to improve the food film packaging properties. Semolia flour had been used to make a food film packaging incorporated with the Zinc Oxide. It was found that Semolia flour have great gluten content which can enhance the biopolymer film's nutritional properties (Jafarzadeh *et al.*, 2017). Other than that, Hydroxypropyl-methylcellulose (HPMC) had been reported to have low