



**PREPARATION AND
CHARACTERIZATION OF PH-
SENSITIVE FISH GELATIN FILM
CONTAINING ANTHOCYANINS
EXTRACTED FROM RAMBUTAN PEEL**

by

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TABLE OF CONTENTS

	Page
Acknowledgements	ii
Table of Contents	iii
List of Tables	vi
List of Figures	vii
List of Symbols and Abbreviations	viii
Abstrak	xi
Abstract	xii
CHAPTER 1 INTRODUCTION	1
1.1 Research background	1
1.2 Problem statement	4
1.3 Research objectives	5
CHAPTER 2 LITERATURE REVIEW	6
2.1 Food packaging	6
2.1.1 Smart packaging	6
2.1.1a Intelligent packaging	7
2.1.1b Active packaging	8
2.2 Edible films	9
2.2.1 Protein based films	9
2.3 Edible films characterization	11
2.3.1 Mechanical properties	11
2.3.2 Physical properties	12

2.3.2a	Water vapor permeability	12
2.3.2b	Light transmittance	12
2.3.2c	Fourier Transform Infrared (FTIR) spectroscopy	13
2.3.3	Morphological properties	13
2.4	Anthocyanin	14
2.4.1	Stability of anthocyanin	16
2.4.2	pH sensitivity	16
2.5	Red rambutan peel	17
2.6	pH indicator film	19
CHAPTER 3 MATERIALS AND METHODS		24
3.1	Materials	24
3.2	Extraction of anthocyanins from rambutan peel	24
3.3	Determination of total anthocyanin content	25
3.4	Preparation of fish gelatin/rambutan peel pH-sensitive film	25
3.5	Film characterization	26
3.5.1	Film thickness and moisture content	26
3.5.2	Scanning electron microscopy (SEM)	27
3.5.3	Fourier transform infrared (FTIR) spectroscopy	27
3.5.4	Mechanical properties	27
3.5.5	Water vapor permeability	28
3.5.6	Color analysis	29
3.5.7	Light transmittance	29
3.5.8	pH-sensing evaluation	30

3.6 Statistical analysis	30
CHAPTER 4 RESULTS AND DISCUSSION	31
4.1 Film thickness and moisture content	31
4.2 Scanning electron microscopy	32
4.3 Fourier transform infrared (FTIR) spectroscopy	34
4.4 Mechanical properties	36
4.5 Water vapor permeability	37
4.6 Color analysis	39
4.7 Light transmittance	40
4.8 pH-sensing evaluation	41
CHAPTER 5 CONCLUSION & RECOMMENDATION	44
5.1 Conclusion	44
5.2 Recommendation	45
REFERENCES	46
APPENDICES	54

LIST OF TABLES

Table caption	Page
2.1 The test of pH indicator film based on different types of polymers and source of anthocyanin.	22
4.1 Thickness and moisture content of fish gelatin films.	32
4.2 Color properties of fish gelatin films.	39
4.3 Color spectrum of the fish gelatin films as a function of pH.	43

LIST OF FIGURES

Figure caption	Page
2.1 Basic structure of anthocyanin.	15
4.1 SEM images of cross section of fish gelatin films	33
4.2 FTIR spectra of fish gelatin films.	35
4.3 Tensile strength (A) and elongation at break (B) for fish gelatin films.	37
4.4 Water vapor permeability for fish gelatin films.	38
4.5 Light transmittance (%) for fish gelatin films.	41

LIST OF ABBREVIATIONS

Abbreviation	Caption
ΔE	The color changes
<i>A</i>	Absorbance
ATR-FTIR	Attenuated Total Reflectance Fourier Transform Infrared
Ca	Calcium
$\text{CH}_3\text{CO}_2\text{Na}\cdot 3\text{H}_2\text{O}$	Sodium acetate
cm	Centimeter
Cu	Copper
<i>d</i>	film thickness (mm)
<i>DF</i>	Dilution factor
ε	molar absorptivity constant
EAB	Elongation at break
Fe	Iron
FTIR	Fourier Transform Infrared
<i>g</i>	gram
HDPE	High density polyethylene
hr	Hour
K	Potassium
KCl	Potassium chloride
kV	kilovolt
L	Liter
LDPE	Low density polyethylene

Mg	Magnesium
mg	milligram
mL	milliliter
mm	millimeter
Mn	Manganese
min	Minutes
<i>MW</i>	Molecular weight
Na	Sodium
nm	nanometer
RFID	radiofrequency identification
RH	Relative humidity
RH ₁	Relative humidity of desiccator
RH ₂	Relative humidity of permeation cell
RPE	Rambutan peel extract
RPF _G	Rambutan peel/fish gelatin
RPF _G 0	Rambutan peel/fish gelatin film without containing rambutan peel extracts
RPF _G 1	Rambutan peel/fish gelatin film containing 10 mL rambutan peel extracts
RPF _G 2	Rambutan peel/fish gelatin film containing 20 mL rambutan peel extracts
RPF _G 3	Rambutan peel/fish gelatin film containing 30 mL rambutan peel extracts

rpm	Revolution per minute
S	Saturated water vapor pressure at test temperature (Pa)
SEM	Scanning electron microscope
TS	Tensile strength
UV	Ultraviolet
UV-vis	Ultraviolet visible region
w/w	Weight per weight
W_i	Initial weight of film
W_t	Weight of the film at certain time
WVP	Water vapor permeability
WVTR	Water vapor transmission rate
Zn	Zinc

PENYEDIAAN DAN PENCIRIAN FILEM GELATIN IKAN SENSITIF PH YANG MENGANDUNGI ANTOSIANIN YANG DIPEROLEH DARIPADA KULIT RAMBUTAN

ABSTRAK

Kajian ini bertujuan untuk menyediakan dan mencirikan filem sensitif terhadap pH untuk pembungkusan pintar berasaskan gelatin ikan yang dicampurkan dengan antosianin yang diekstrak daripada kulit rambutan merah. Filem sensitif pH dibuat dengan kaedah acuan pelarut dan jumlah kandungan antosianin kulit rambutan ditentukan dengan kaedah pembezaan pH. Pencirian filem ini diperhatikan melalui sifat mekanikal, morfologi dan fizikal filem. Hasil kajian filem daripada spektrum FTIR dan keratan rentas SEM menunjukkan terdapat interaksi intermolekul antara gelatin ikan dan antosianin kulit rambutan. Ketebalan, kekuatan tensil dan pemanjangan pada takat putus filem dipengaruhi oleh kepekatan RPE. Walau bagaimanapun, kandungan kelembapan dan sifat penghalang air filem tidak dipengaruhi oleh kepekatan RPE. Di samping itu, keupayaan penghalang cahaya filem RPF3 yang ditunjukkan oleh pemancar cahaya UV-vis berkadar langsung dengan kepekatan RPE yang ditambah. Tindak balas warna filem dalam keadaan berasid (pH 4) dan beralkali (pH 9) menunjukkan intensiti warna merah yang rendah dan intensiti hijau yang rendah masing-masing. Pada pH 4 dan 9, RPF3 mempunyai nilai ΔE^* yang tertinggi dibandingkan dengan RPF1 dan RPF2 yang mana menunjukkan filem RPF3 mempunyai variasi warna visual yang baik bergantung pada nilai pH. Oleh itu, filem gelatin ikan yang digabungkan dengan antosianin yang diekstrak dari kulit rambutan berpotensi digunakan sebagai petunjuk pH pembungkusan pintar.

PREPARATION AND CHARACTERIZATION OF PH-SENSITIVE FISH GELATIN FILM CONTAINING ANTHOCYANINS EXTRACTED FROM RAMBUTAN PEEL

ABSTRACT

This study aimed to prepare and characterize a pH sensitive film for intelligent packaging based on fish gelatin doped with anthocyanins extracted from red rambutan peel. The pH sensitive film was prepared by solvent casting method and total anthocyanin content of rambutan peel was determined by pH differential method. The characterization of the film was observed through mechanical, morphological and physical properties of the film. The result from FTIR spectra and SEM of cross section of the films reflects there are intermolecular interactions between fish gelatin and anthocyanins of rambutan peel. The thickness, tensile strength and elongation at break of the films were affected by the concentration of RPE. However, moisture content and water barrier properties of the film were not affected by the concentration of RPE. In addition, the light barrier ability of RPFG film that shown by UV-vis light transmittance is directly proportional with the concentration of incorporated RPE. The color response of the film in the acidic (pH 4) and alkaline (pH 9) showed a low intensity of red color and a low intensity of green respectively. At pH 4 and 9, RPFG3 has the highest ΔE^* value compared with RPFG1 and RPFG2 which indicates RPFG3 film has good visual color variability depending on the pH value. Thus, fish gelatin film incorporated with anthocyanins extracted from rambutan peel has a potential to use as a pH indicator of intelligent packaging.