

# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME II

Editors:

Ibrahim Ali Noorbatcha  
Hamzah Mohd. Salleh  
Mohamed Elwathig Saeed Mirghani  
Raha Ahmad Raus



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

**CURRENT RESEARCH AND  
DEVELOPMENT IN  
BIOTECHNOLOGY ENGINEERING  
AT IIUM**

*(VOLUME II)*

**Editors:**

**Ibrahim Ali Noorbacha**

**Hamzah Mohd. Salleh**

**Mohamed Elwathig Saeed Mirghani**

**Raha Ahmad Raus**

**Department of Biotechnology Engineering  
Faculty of Engineering  
International Islamic University Malaysia**



**IIUM Press**

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Ibrahim Ali Noorbacha, Hamzah Mohd. Salleh, Mohamed Elwathig Saeed Mirghani & Raha Ahmad Raus: Current Research and Development in Biotechnology engineering at IIUM  
Volume II

ISBN: 978-967-418-151-2

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :  
**IIUM PRINTING SDN. BHD.**  
No. 1, Jalan Industri Batu Caves 1/3  
Taman Perindustrian Batu Caves  
Batu Caves Centre Point  
68100 Batu Caves  
Selangor Darul Ehsan

## CONTENTS

PREFACE		v
CHAPTER 1	SCREENING FOR ANTI-CANCER COMPOUND FROM SELECTED MALAYSIAN PLANTS BY SULFORHODAMINE B ASSAY ON MCF-7 CANCER CELL LINE <i>Azura Amid, Abdul Aziz Ahmad and Raha Ahmad Raus</i>	1
CHAPTER 2	THE EVALUATION ON ANTICANCER PROPERTIES FROM KENAF SEEDS OIL FROM DIFFERENT VARIETIES <i>Azura Amid, Parveen Jamal, Nurul Elyani Mohamad and Engku Hasmah Engku Abdullah</i>	9
CHAPTER 3	SCREENING AND EVALUATION OF ANTICANCER PROPERTY IN MANGO FRUIT <i>Mangifera indica</i> <i>Azura Amid, Irwandi Jaswir and Muhd. Ezza Faiez Othman</i>	16
CHAPTER 4	SENSORY EVALUATION AND CONTAMINATION TEST ON MANGO FRUIT ( <i>Mangifera indica</i> ) PUREE <i>Azura Amid, Irwandi Jaswir and Muhd. Ezza Faiez Othman</i>	23
CHAPTER 5	THE OBSERVATION ON THE INHIBITION OF ANTI- INFLAMMATORY MEDIATOR OF THE TOMATO LEAVES EXTRACT <i>Azura Amid, Sulawati Semail and Parveen Jamal</i>	30
CHAPTER 6	A STUDY OF BACTERIAL CELL IMMOBILIZATION IN ALGINATE GEL BEADS FOR THE PRODUCTION OF <i>MYO</i> - INOSITOL PHOSPHATES <i>Noor Illi Mohamad Puad, Abd-ElAzizem Farouk and Hamzah Mohd. Salleh</i>	36
CHAPTER 7	EXTRACTION AND EVALUATION OF ANTIBACTERIAL ACTIVITY FROM SELECTED FLOWERING PLANTS <i>Raha Ahmad Raus, Erlina Abdullah and Parveen Jamal</i>	43

CHAPTER 8	EXTRACTION OF ANTIBACTERIAL COMPOUNDS FROM PLANTS USING SONICATOR <i>Raha Ahmad Raus, Nur Shazwana Mohd Puzi and Parveen Jamal</i>	50
CHAPTER 9	EXTRACTION AND EVALUATION OF ANTICANDIDAL ACTIVITY FROM SELECTED MALAYSIAN PLANTS <i>Raha Ahmad Raus, Nor Azlin Alia Nor Muhammad and Jacinta Santhanam</i>	57
CHAPTER 10	EXTRACTION AND EVALUATION OF ANTIFUNGAL ACTIVITY FROM SELECTED MALAYSIAN PLANTS <i>Raha Ahmad Raus, Hayatunissa Samsuddin, Nor Hafizah Addnan and Jacinta Santhanam</i>	62
CHAPTER 11	MOLECULAR MODELING OF BIODEGRADATION POLYESTERS USING LIPASE <i>Ibrahim Ali Noorbatcha, Nor Afina Eidura Hussin and Hamzah Mohd Salleh</i>	68
CHAPTER 12	POTENTIAL OF NAHAR SEED OIL EXTRACT AS ANTIMICROBIALS <i>Mohamed E. S. Mirghani, I. A. Ahmed, S. A. Muyibi., J. I. Daoud and M. A. Mikail</i>	74
CHAPTER 13	NAHAR ( <i>Mesua ferrea</i> ) TREE AS A MEDICINAL PLANT <i>Mohamed E. S. Mirghani, I. A. Ahmed, S. A. Muyibi., J. I. Daoud and M. A. Mikail</i>	82
CHAPTER 14	EXPLOIT OF MALAYSIAN MANGO KERNEL EXTRACT AS ANTIBACTERIAL AGENT <i>Mohamed Elwathig Saeed Mirghani, Nasereldin A. Kabbashi, Parveen Jamal and H. A. Abdullah</i>	90
CHAPTER 15	PREPARATION OF NUTRITIOUS DRINK FROM DATE PALM KERNEL (DPK) <i>Mohamed Elwathig Saeed Mirghani, Irwandi Jaswir and Nurul Hanan Mustapha</i>	101
CHAPTER 16	DATE SEED EXTRACT AS PRESERVATIVES <i>Mohamed E. S. Mirghani, M. A. Mikail, I. A. Ahmed, M. I. Abdul Karim and J. I. Daoud</i>	113

CHAPTER 17	IMMOBILIZATION OF LIPASE BY CROSS-LINKED ENZYME AGGREGATE (CLEA) TECHNOLOGY <i>Faridah Yusof and Nik Rashidah Nik Abdul Ghani</i>	120
CHAPTER 18	DETECTION OF ETHANOL IN BEVERAGES USING AN ELECTRONIC NOSE <i>Irwandi Jaswir, Nurul Asyikeen A.M and Rini Akmeliawati</i>	130
CHAPTER 19	EFFECTS OF CELL IMMOBILIZATION TO THE PHYTATE-DEGRADING ENZYME ACTIVITY <i>Noor Illi Mohamad Puad, Abd-ElAzim Farouk and Hamzah Mohd. Salleh</i>	137
CHAPTER 20	ENZYMATIC DEVULCANIZATION OF WASTE RUBBER <i>Faridah Yusof and Ainie Asyikin Ahmad</i>	144
CHAPTER 21	EXTRACTION AND CHARACTERIZATION OF ASTAXANTHIN FROM MARINE SOURCES <i>Irwandi Jaswir, Shazana Azfar and Azura Amid</i>	154
CHAPTER 22	EXTRACTION OF FISH COLLAGEN USING ENZYMATIC PROCESS <i>Irwandi Jaswir, Noor Yulsida Hazahari and Mohamed Elwathig Saeed Mirghani</i>	159
CHAPTER 23	FROM RECREATION MATHEMATICS TO PSEUDO-GENES <i>Ibrahim Ali Noorbatcha and Ahmad Faizul Shamsudin</i>	166
CHAPTER 24	MECHANICAL PROPERTIES OF A GELATIN REPLACER, PECTIN, FROM BANANA AND MANGO PEELS <i>Hamzah Mohd. Salleh, Irwandi Jaswir and Hamida Zakaria</i>	173
CHAPTER 25	DEVELOPMENT OF <i>IN-VIVO</i> BIOFUEL CELL FOR IMPLANTABLE MEDICAL DEVICES <i>Hamzah Mohd. Salleh, Nur Syaheera Mohd Yusoff, Raihan Othman and Mohd. Firdaus Abd. Wahab</i>	182
CHAPTER 26	IMPROVEMENT OF EXTRACTION PROCESSING CONDITIONS FOR ANTIBACTERIAL COMPOUNDS FROM <i>Curcuma longa</i>	192

*Raha Ahmad Raus, Nur Fariah Abdul Malek, Mohd Saufi Bastami  
and Noriha Mat Amin*

CHAPTER 27	IMPROVEMENT OF SONICATION PROCESSING CONDITIONS FOR EXTRACTION OF ANTIBACTERIAL COMPOUNDS FROM <i>Spathiphyllum cannifolium</i> <i>Raha Ahmad Raus, Nur Shazwana Mohd Puzi and Parveen Jamal</i>	199
CHAPTER 28	IMPROVING ENZYME CATALYSIS THROUGH THE IMPROVEMENT OF BINDING STRENGTH: SIMULATED MUTATION TO PREDICT THE MUTATIONAL EFFECT ON XYLANASE CEX <i>Ibrahim Ali Noorbatcha, Muaz Abdul Hadi, Ahmad Faris Ismail and Hamzah Mohd Salleh</i>	207
CHAPTER 29	MOLECULAR INTERACTION ANALYSIS TO DESIGN NEW DRUG CANDIDATES FOR LYSOSOMAL STORAGE DISEASE <i>Ibrahim Ali Noorbatcha, Muaz Abdul Hadi, Zarul Azwan Adam and Hamzah Mohd. Salleh</i>	215
CHAPTER 30	MECHANICAL IMPROVEMENT OF HALAL GELATIN FROM MARINE SOURCES <i>Irwandi Jaswir, Aniza Binti Asari and Hamzah Mohd. Salleh</i>	222
CHAPTER 31	PERFORMANCE OF ARTIFICIAL ANTIOXIDANTS IN RBD PALM OLEIN DURING DEEP-FAT FRYING <i>Irwandi Jaswir and Ahmad Badli Yusoff</i>	229
CHAPTER 32	PHYSICO-CHEMICAL PROPERTIES OF COLLAGEN EXTRACTS FROM TWO LOCAL FISH SPECIES <i>Irwandi Jaswir, Nur'ain Che Kamaludin and Hamzah Mohd. Salleh</i>	237
CHAPTER 33	PHYTOCHEMICAL SCREENING AND PURIFICATION OF XO1 FROM SELECTED MEDICINAL PLANT <i>Parveen Jamal, Azura Amid and Suhana Abdullah</i>	242
CHAPTER 34	POTENTIAL ENERGY SURFACES FOR REACTIONS AMONG HYDROGEN FLUORIDE MOLECULES <i>Ibrahim Ali Noorbatcha, Borhannuddin Arifin and Sharifudin M Zain</i>	251

CHAPTER 35	POTENTIAL REMEDIES FOR GOUT FROM MEDICINAL PLANTS <i>Parveen Jamal, Saiful Mohammad Nizam Azmi and Azura Amid</i>	262
CHAPTER 36	PRODUCTION OF CARRAGEENAN FROM MALAYSIAN SEAWEED <i>Irwandi Jaswir, Ainur Farhana and Parveen Jamal</i>	272
CHAPTER 37	PRODUCTION OF GELATIN REPLACERS FROM MALAYSIAN TUBEROUS PLANTS <i>Irwandi Jaswir, Nurul Ain Zafirah Binti Kamalurudin and Hamzah Mohd. Salleh</i>	279
CHAPTER 38	PURIFICATION OF PATATIN-LIKE PROTEIN (HEV B7) FROM SKIM LATEX OF <i>Hevea brasiliensis</i> <i>Faridah Yusof and Nurul Ain Harmiza Abdullah</i>	285
CHAPTER 39	PURIFICATION OF SUPEROXIDE DISMUTASE FROM <i>Hevea brasiliensis</i> LEAF EXTRACT <i>Faridah Yusof and Nazhirah Mohamed</i>	296
CHAPTER 40	QUALITATIVE AND QUANTITATIVE ANALYSIS OF ANTI-GOUT FROM <i>Carica papaya</i> LEAVES <i>Parveen Jamal, Saiful Mohammad Nizam Azmi and Azura Amid</i>	306
CHAPTER 41	RECYCLING OF WASTE RUBBER VIA MICROBIAL DEVULCANIZATION <i>Faridah Yusof and Ainie Asyikin Ahmad</i>	316
CHAPTER 42	SCREENING ANTI-CANCER COMPOUNDS FROM PALM OIL INDUSTRIAL WASTES <i>Raha Ahmad Raus, Syamsa Shazwan Shamsudin and Parveen Jamal</i>	326
CHAPTER 43	SCREENING ANTI-CANCER COMPOUNDS FROM MEDICINAL MALAYSIAN PLANTS <i>Raha Ahmad Raus, Yusuf Johari and Azura Amid</i>	332
CHAPTER 44	SCREENING ANTI-CANCER COMPOUNDS FROM RICE INDUSTRIAL WASTES <i>Raha Ahmad Raus, Mohd Hafizul Muhammad and Parveen Jamal</i>	338



CHAPTER 45	SOLUBILIZATION OF VITAMIN E IN CULTURE MEDIUM AND ITS ANTIOXIDANT ACTIVITY <i>Irwandi Jaswir and Siti Fairus Sahul Hamid</i>	342
CHAPTER 46	STRUCTURE ACTIVITY RELATIONS IN PENTACYCLIC TRITERPENOID TOWARDS HYALURONIDASE INHIBITORY ACTIVITY <i>Ibrahim Ali Noorbatcha, Nor Hayati Abdullah and Khalijah Awang</i>	348
CHAPTER 47	<i>IN SILICO</i> PREDICTION OF ANTICANCER ACTIVITY OF NITROSOUREAS <i>Ibrahim Ali Noorbatcha, Farahana Hamzah, Hamzah Mohd. Salleh and Syed Zahir Idid</i>	356
CHAPTER 48	BIOMOLECULAR COMPUTING IN DEGENERATIVE BRAIN RESEARCH <i>Ibrahim Ali Noorbatcha and Ahmad Faizul Shamsudin</i>	363
CHAPTER 49	ISOLATION AND IDENTIFICATION OF FERULIC ACID FROM RICE BRAN <i>Faridah Yusof and Aimi Izyana Ismail</i>	370
CHAPTER 50	IMPROVEMENT OF EXTRACTION PROCESSING CONDITIONS FOR ANTIFUNGAL COMPOUNDS FROM <i>Alpinia galanga</i> <i>Raha Ahmad Raus, Nor Hafizah Addnan, Noriha Mat Amin and Syamsiah Aini Shohaimi</i>	379

## CHAPTER 32

### PHYSICO-CHEMICAL PROPERTIES OF COLLAGEN EXTRACTS FROM TWO LOCAL FISH SPECIES

Irwandi Jaswir, Nur'ain Che Kamaludin and Hamzah Mohd. Salleh

Department of Biotechnology Engineering, Faculty of Engineering,  
International Islamic University Malaysia, P.O. Box 10, 50728 Kuala Lumpur, Malaysia

#### ABSTRACT

Production of high quality gelatin from *Labeo rohita* (rohu) skin and *Megalaspis cordyla* (torpedo scad) skin and scale as an alternative of porcine and bovine gelatin has been conducted through modification process using transglutaminase. Screening showed that *Labeo rohita* (rohu) skin has a better quality of gelatin with the maximum gel strength and viscosity values after the modification. The gel strength is 114.70g with TGase addition while the viscosity is 0.01960 Pa. The results of this study suggest that transglutaminase concentration, incubation time and incubation temperature affect the gel strength and viscosity of the gelatin produced. Central composite Design (CCD) from Design Expert was applied to determine the optimal conditions for the modification for the highest values of gel strength. The optimum modification conditions were attained at 6 °C incubation temperature for 24h incubation time and TGase concentration is 0.15g/ml. The gelatin obtained from these conditions is 10.71g.

**Keywords:** fish collagen, *Labeo rohita*, *Megalaspis cordyla*, physic-chemical properties

#### INTRODUCTION

Different techniques exist for extracting gelatin from fish. These include using aqueous and organic solvents to extract gelatin at elevated temperatures. These methods normally adversely affect the functional and organoleptic properties of gelatin and may produce toxic by-products.

Biological processes using endogenous or exogenous enzymes are now more frequently employed in industrial practices to make gelatin, because enzyme hydrolysis is usually a mild process that results in products of high functionality, good organoleptic properties, and excellent nutritional value without the formation of toxic byproducts.

Meanwhile, to improve the physicochemical and mechanical properties of gelatin, researchers have investigated various approaches to modify fish gelatin in an effort to improve its functionality. The blending of fish gelatin with other biopolymers, such as j-carrageenan,