# CHARACTERIZATION AND THERMAL PROPERTIES OF CHITOSAN/AGAR BLENDS HYDROGEL MEMBRANES

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## Contents

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# BORANG LAPORAN AKHIR
# GERAN PENYELIDIKAN DANA KCM

| **BAHAGIAN A : MAKLUMAT PEMOHON** | | | |
|---|---|---|---|
| Nama Pemohon | FAIEZAH BINTI HASHIM | | |
| Alamat Pusat Tanggung Jawab (PTJ) | RMI UITM PERLIS | | |
| No Fail Penaja | 600-RMI/ST/DANA 5/3/Dst (61/2009) | No. Fail RMI | |
| Kod Projek Bendahari | | | |
| Tajuk Projek: | CHARACTERIZATION AND THERMAL PROPERTIES OF CHITOSAN/AGAR BLEDS HYDROGEL MEMBRANE | | |

| **BAHAGIAN B : MAKLUMAT PROJEK PENYELIDIKAN** | |
|---|---|
| Tarikh Mula Projek | 20 OGOS 2009 |
| Tarikh Tamat Projek (asal)<br>Tarikh Tamat Projek (kini) | 15 Jun 2010<br>1 July 2011 |
| % Prestasi Projek (*milestone)* | 100% |
| Jum. Peruntukan diluluskan (RM) | RM 7500 |
| Jum. Belanja (RM) | RM 5708 |
| Baki Peruntukan (RM) | RM 1792 |
| % Perbelanjaan Peruntukan | 76.1% |

# 5. Report

## 5.1 Proposed Executive Summary

Continuous awareness of ecological problem has led to a paradigm shift on the use of biodegradable materials, especially from renewable agriculture feedstock and marine food processing industry wastes. Developments in the field of biomaterials have lead to significant advancements in the extraction of chitosan from local sources. Chitosan has been found in applications for bio-medicine (wound dressings), tissue engineering (artificial skin), bone tissue engineering and one of the promising materials for preparing hydrophilic membranes and it has been widely studied. Most of the chitosan membranes so far have been fabricated using commercial chitosan. Nowadays, the main sources of chitosan are crab and shrimp shell. As the combination of properties of chitosan such as water binding capacity, fat binding capacity, bioactivity, biodegrability, and antifungal activity, chitosan and its modified analogs have shown many applications in medicine, cosmetics, agriculture, biochemical separation systems, tissue engineering, biomaterials and drug controlled release systems. However, chitosan also has some drawbacks, it being soluble in aqueous medium only in the presence of small amount of acid. Its mechanical properties have also proved to be unsuitable in some biomedical applications. In order to eliminate the disadvantageous, it can be modified by physical blending or/and chemical modification by grafting, interpenetrating polymer networks and crosslinking method. In this study, an attempt has been made to blend chitosan with other gelling material which is agar. Biopolymer from agar (polysaccharide) has received particular attention due to their natural origin, low cost and good compatibility. Since agar have good compatibility with most other polysaccharides and with proteins in near neutral conditions, blends of agar with chitosan may lead to the enhancement of the physical properties of chitosan membrane

## 5.3 Introduction

Membrane can be defined as layer of materials serves as a selective obstruction between two phases and remains impermeable to specific particles, molecules or substance when exposed to the driving force. There are three types of membrane which is inorganic, polymeric and biological membranes. These three types of membranes differ significantly in their structure and functionality. Recently, there is a development of membranes from natural polymer which have wide potential applications in the fields of foods, biomaterials, agriculture and water purification. Besides that, interest also increase in the fabricating of hydrogel membrane. Concerning definitions of hydrogel types, according to the source, hydrogels can be divided into those formed from natural polymers and those formed from synthetic polymers. To date, there is an increasing interest in the use of biodegradable polymers as main materials to develop the hydrogel membranes due to awareness on environmental problems.

Several studies have been done on the utilizing of biodegradable polymer as main materials in hydrogel membranes such as chitosan/soy protein (S.S. Silva *et al.,* 2007), chitin (H. Tamura *et al.,* 2011), cellulose/chitin (J. Wu *et al.,* 2010), chitosan/PVA (J.M. Yang *et al.,* 2004) and agar/PVA (J.G. Lyons *et al.,* (2009). To date, chitosan become one of the promising biopolymer in membrane fabrication due to water binding capacity, fat binding capacity, bioactivity, biodegradability, nontoxiticity, biocompatibility and antifungal activity (J.M Yang *et al.*, 2004). Chitosan has been found in applications for bio-medicine (wound dressings), tissue engineering (srtificial skin), bone tissue enginnering and one of the promising materials for preparing hydrogel membranes and it has been widely studied. Most of the chitosan membranes so far have been fabricated using commercial chitosan. Nowadays, the main sources of chitosan are crab and shrimpshell.

However for some reason chitosan is not effectively used because of its low solubility in aqueous solution, low mechanical strength and toughness, and difficulty. In order to eliminate the disadvantages, properties of chitosan membrane can be modified by physical blending, chemical modification by