

**PREPARATION AND CHARACTERISATION OF
WOUND DRESSING MATERIALS FROM
GELLAN GUM INCORPORATED VIRGIN
COCONUT OIL AND NORFLOXACIN**

NUR ARIFAH BINTI ISMAIL @ MOHD ISMAIL

**MASTER OF SCIENCE
UNIVERSITI MALAYSIA TERENGGANU**

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**Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of
Science in the School of Fundamental Science
Universiti Malaysia Terengganu
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Dedicated to

My beloved parents and siblings

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfilment of the requirements for the degree of Master of Science

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Main Supervisor : Khairul Anuar Mat Amin, Ph.D

School : School of Fundamental Science

The aim of this research is to study the effects of addition of virgin coconut (VCO) oil and norfloxacin (NOR) to gellan gum (GG) films. Virgin coconut oil has been reported as a promising candidate in promoting healing process and norfloxacin has been known to contain strong antibacterial properties. In this study, the preparation and characterizations of gellan gum film incorporated with virgin coconut oil and norfloxacin has been described. The GG-VCO films with enhanced mechanical properties were developed by harnessing the ability of carboxyl and hydroxyl groups of gellan gum and virgin coconut oil, respectively via hydrogen bonding forces. Incorporation of virgin coconut oil significantly enhances both the toughness and strain-at-break of GG-VCO film, which dependent on the concentration of virgin coconut oil. On the other hand, due to the cross-linked networks of the film, the water vapor transmission rates and swelling behavior were decreased upon addition of higher content of virgin coconut oil. The qualitative antibacterial results of GG-

VCO film against *Escherichia coli* and *Staphylococcus aureus* does not show any inhibition around the samples. The addition of norfloxacin to the gellan gum film improved the antibacterial properties against those bacteria but with limited flexibility (tensile strain). By combining norfloxacin and VCO into GG composite films, the mechanical properties and antibacterial activities were improved. The thermal stability of the GG composite films also improved the on-set (247 °C) and off-set (579 °C) values. Besides that, from the cell studies, the composite film showed the potential to be as a candidate for wound dressing material. This due to the number of cell growth are increased from day 1 to day 3, proved the composite materials are not toxic to the cell.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu
sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

**PENYEDIAAN DAN PENCIRIAN PEMBALUT LUKA DARIPADA GELLAN
GUM DIGABUNGAN DENGAN MINYAK KELAPA DARU DAN
NORFLOXACIN**

NUR ARIFAH BINTI ISMAIL @ MOHD ISMAIL

2015

Penyelia Utama : Khairul Anuar Mat Amin, Ph.D

Pusat Pengajian : Pusat Pengajian Sains Asas

Tujuan penyelidikan ini adalah untuk mengkaji kesan penambahan minyak kelapa dara dan norfloxacin ke atas gellan gum. Minyak kelapa dara telah dilaporkan menjanjikan potensi dalam proses penyembuhan dan norfloxacin telah diketahui mengandungi ciri- ciri antibakteria yang kuat. Dalam kajian ini, kami menjalankan sintesis dan pencirian kepada filem gellan gum yang mengandungi minyak kelapa dara dan norfloxacin. Filem-filem GG-VCO dengan penambahbaikan ciri-ciri mekanikal telah dihasilkan melalui kebolehan pengawalan kumpulan karboksil dan hidroksil gellan gum dan minyak kelapa dara melalui daya-daya ikatan hidrogen. Penambahan minyak kelapa dara menunjukkan penambahan ketara kepada kekuatan dan terikan pada takat putus pada filem GG-VCO, yang mana bergantung kepada kepekatan minyak kelapa dara. Selain daripada itu, penyilangan rantaian filem mempengaruhi kadar kemeruapan air dan sifat pengembangan yang mana telah menurun bergantung kepada peningkatan penambahan minyak kelapa dara. Keputusan kualitatif menunjukkan *Escherichia coli* dan *Staphylococcus aureus* tidak

menunjukkan sebarang kawasan yang dihalang pertumbuhan bakteria di sekeliling sampel. Penambahan norfloxacin kepada filem gellan gum meningkatkan ciri antibakteria menentang bakteria-bakteria tersebut tetapi mengurangkan fleksibility filem. Bagi meningkatkan kedua-dua pencirian mekanikal dan antibakteria, norfloxacin telah ditambah kepada filem GG-VCO untuk menghasilkan filem komposit. Berdasarkan kajian ini, filem komposit menunjukkan penambahbaikan pada ciri-ciri mekanikal dan kestabilan termal berdasarkan peningkatan nilai mula (247 °C) dan nilai akhir (579 °C). Selain daripada itu, daripada kajian-kajian sel, filem komposit menunjukkan potensi untuk dijadikan sebagai bahan pembalut luka. Hal ini bergantung kepada bilangan sel yang hidup bertambah dari hari pertama hingga ke hari ketiga, membuktikan bahan komposit tidak toksik kepada sel.