INTISARI

Kitosan dan *polyvinyl alcohol* (PVA) merupakan bahan *biopolymer* yang banyak dikembangkan guna aplikasi dibidang biomedis, diantaranya sebagai bahan pembalut luka karena sifatnya yang memberikan efek penyembuhan dan dapat menyesuaikan terhadap jaringan tubuh pasien. Pembalut luka dibuat dengan basis membran *serat nano* menggunakan metode elektrospinning sehingga dapat meningkatkan mutu serta kualitas produk. Untuk menghasilkan membran serat nano yang baik maka diperlukan preparasi material yang tepat. Oleh karena itu, pada penelitian ini dibuat membran serat nano dari bahan kitosan dan PVA pada kondisi *blend* menggunakan metode electrospinning dengan memvariasi konsentrasi kitosan untuk mendapatkan pengaruh penambahan konsentrasi kitosan pada larutan PVA terhadap perubahan morfologi dan sifat tarik memmbran serat nano kitosan/PVA.

Pembuatan serat nano terlebih dahulu dilakukan dengan melarutkan kitosan pada kondisi asam menggunakan 2% asam asetat dengan variasi konsentrasi kitosan 1%, 3%, 5%, dan 7%. Selanjutnya larutan kitosan sebagai *filler* dicampurkan pada 10% *polyvinyl alcohol* (PVA) pada persentase pencampuran PVA dan kitosan 95:5. Parameter elektrospinning yang digunakan meliputi tegangan 18 kV, jarak TCD 16,5 cm, diameter internal (ID) jarum syringe 0,6 mm dan flow rate 0,33 µl/min. Pada penelitian ini dilakukan karakterisasi diantaranya uji fisis dan mekanis. Uji fisis yang dilakukan meliputi pengujian viskometer dan Scanning Electron Microscopy (SEM), sedangkan uji mekanis dilakukan pengujian tarik dengan standar penguian ASTM D 882 menggunakan *universal testing machine* (UTM).

Hasil penelitian ini menunjukan bahwa sifat larutan *spinning* mempengaruhi morfologi membran serat nano. Kenaikan viskositas mampu mempengaruhi keseragaman diameter serat nano. Larutan tanpa penambahan kitosan menghasilkan viskositas yang paling rendah yaitu 339,9 cP dengan persebaran ukuran diameter serat yang didominasi oleh serat berukuran 150 nm. Nilai viskositas paling tinggi ditunjukan pada pencampuran kitosan 7% yaitu 564,9 cP yang didominasi serat nano berukuran 350 nm. Adapun hasil uji sifat tarik menunjukkan bahwa membran serat nano pada pencampuran kitosan 7% memiliki nilai kuat Tarik yang paling rendah yaitu 3,68 MPa elongasi max 160%. Hasil optimum ditunjukan pada sampel dengan penambahan konsentrasi kitosan 3% yang memiliki kuat Tarik paling tinggi sebesar 5,6207 MPa elongasi max 150% dengan rata-rata ukuran diameter mecapai 271 nm. Membran serat nano dengan penambahan konsentrasi kitosan sebesar 3% memenuhi kualifikasi standar material pembalut luka (kuat tarik 1-24 MPa dan elongasi 17-207%).

Kata kunci: ***polyvinyl alcohol*** **(PVA), kitosan, elektrospinning, serat nano, sifat tarik**

ABSTRACT

Chitosan and polyvinyl alcohol (PVA) are biopolymer materials being developed in biomedical applications, one of them is used as wound dressing material under the considerations that they have healing effect and their biocompatible characteristics with human's tissues. Wound dressing materials are produced by applying nanofibers' basis using electrospinning method so that the produced materials can have better quality. In order to produce good nanofibers' membrane, the preparation materials are needed. Based on that consideration, this study fabricates the nanofibers membrane from chitosan and PVA in blend condition through electrospinning method by varying the chitosan concentrations to get the effect of chitosan addition to PVA solution to the morphology and tensile strength of nanofibers of chitosan/PVA.

The fabrication of nanofibers was first done through dissolving Chitosan to the acid condition by using 2% acetate acid in the chitosan concentration's variations; 1%, 3%, 5% and 7%. After that, chitosan solution as filler was mixed with polyvinyl alcohol (PVA) 10% by following the percentage of mixing PVA and chitosan 95:5. The parameters of the electrospinning used in this study were the electrical voltage 18kV, the TCD distance 16.5 cm, internal diameter (ID) of syringe needle 0.6 mm, and flow rate 0.33 µl/min. There were two kinds of characterizations done in this study, both of them were physical and mechanical testing. The physical testing that has been done covered the viscosities testing and Scanning Electron Microscope (SEM), the mechanical testing that has been done in this study was tensile testing by having the standard of ASTM D 882 using the universal testing machine (UTM).

The results of this research show that the solution characteristic of spinning influences the morphology of nanofibers membrane. The increment of viscosity can influence the uniformity of nanofibers diameter. The solution without chitosan's addition had the lowest viscosity value; it was 339.9 cP with the distribution of diameter size was mostly 150 nm. The highest viscosity value was 564.9 cP and it was gained from the 7% chitosan solution sample with the distribution of the diameter size was mostly 350 nm. The tensile strength test showed that the nanofibers with 7% chitosan concentration having the lowest tensile strength; it was 3.68 MPa with elongation 160%. The optimum result was showed from the sample with the 3% chitosan concentration having the highest tensile strength; it was 5.6207 MPa with max elongation 150% with the average diameter size was 271 nm. Nanofibers membrane with the 3% chitosan concentration addition meets the standard qualification of wound dressing materials (tensile strength 1-24 MPa and elongation 17-207%).

Key words: polyvinyl alcohol (PVA), chitosan, electrospinning, nanofibers, tensile strength