Pengaruh kadar hidroksiapatit ha terhadap sifat sifat komposit polivinil alkohol kitosan ha untuk aplikasi scaffold = Effect of degree of content of hydroxyapatite ha on the properties of poly vinyl alcohol chitosan ha for scaffold application

Debie Maya Puspita, author

Abstrak

[ABSTRAK
Meningkatnya insiden patah tulang di Indonesia dari tahun ke tahun memerlukan pemecahan dari masalah terbatasnya sumber tulang pengganti sementara dengan kriteria sesuai. Oleh karena itu, penelitian ini berfokus pada optimasi sifat-sifat material untuk aplikasi scaffold. Komposit PVA/kitosan-hidroksiapatit (HA) telah berhasil dibuat dengan metode kimiawi basah yang dilanjutkan proses freeze-thawing dan freeze-drying. Variabel yang digunakan adalah kadar hidroksiapatit sebesar 0, 25, 40 dan 50% (b/v). Karakterisasi yang dilakukan adalah spektroskopi Fourier transform infra red (FTIR), scanning electron microscope (SEM), uji tekan, dan swelling behavior. Hasil karakterisasi menunjukkan penambahan hidroksiapatit menghasilkan morfologi berpori dengan ukuran rata-rata 42,39 µm untuk variabel 50% HA, dan meningkatkan modulus tekan dari 14 MPa untuk sampel tanpa HA menjadi 143, 191, dan 187 MPa untuk sampel dengan penambahan HA sebesar 25, 40 dan 50% (b/v). Selain itu penambahan hidroksiapatit juga mengurangi derajat pembengkakan dari 296% untuk sampel tanpa HA menjadi 85, 78, dan 59% untuk sampel dengan penambahan HA sebesar 25, 40 dan 50% (b/v), masing-masing. Hasil ini menunjukkan PVA/kitosan-HA memiliki sifat-sifat potensial untuk digunakan sebagai scaffold dalam rekayasa jaringan tulang.
ABSTRACT
The increasing number of bone fracture incident in Indonesia from year to year needs the problem solving of the limited bone substitute which meet all the criteria. Therefore, this study is focusing in optimization of material?s properties used as scaffold. Composite of PVA/chitosan-hydroxyapatite (HA) was successfully made by wet chemically method which followed by freeze thawing and freeze drying. The variable used in this study is the percentage of hydroxyapatite with 0, 25, 40, and 50% (wt/v). The samples were characterized by using Fourier transform infrared (FTIR) spectroscopy, scanning electron microscope (SEM), compressive test, and swelling behavior. The results showed that addition of hydroxyapatite has yielded porous structure with average pore size of 42,39 µm (50% HA) and increased in compressive modulus from 14 MPa for 0% HA to 143, 191, and 187 MPa for samples with addition of HA with amount of 25, 40, 50% (wt/v). Besides, addition of HA also reduced the swelling ratio from 296% for sample without HA to 85, 78, and 59% for sample with addition of HA with the following amount: 25, 40, and 50% (wt/v), respectively. This results show that PVA/chitosan-HA in the current study is potential to be used as scaffold in bone tissue engineering.
;The increasing number of bone fracture incident in Indonesia from year to year needs the problem solving of the limited bone substitute which meet all the criteria. Therefore, this study is focusing in optimization of material?s properties used as scaffold. Composite of PVA/chitosan-hydroxyapatite (HA) was successfully made by wet chemically method which followed by freeze thawing and freeze drying. The variable used in

this study is the percentage of hydroxyapatite with 0, 25, 40, and 50% (wt/v). The samples were characterized by using Fourier transform infrared (FTIR) spectroscopy, scanning electron microscope (SEM), compressive test, and swelling behavior. The results showed that addition of hydroxyapatite has yielded porous structure with average pore size of 42,39 μm (50% HA) and increased in compressive modulus from 14 MPa for 0% HA to 143, 191, and 187 MPa for samples with addition of HA with amount of 25, 40, 50% (wt/v). Besides, addition of HA also reduced the swelling ratio from 296% for sample without HA to 85, 78, and 59% for sample with addition of HA with the following amount: 25, 40, and 50% (wt/v), respectively. This results show that PVA/chitosan-HA in the current study is potential to be used as scaffold in bone tissue engineering.

, The increasing number of bone fracture incident in Indonesia from year to year needs the problem solving of the limited bone substitute which meet all the criteria. Therefore, this study is focusing in optimization of material's properties used as scaffold. Composite of PVA/chitosan-hydroxyapatite (HA) was successfully made by wet chemically method which followed by freeze thawing and freeze drying. The variable used in this study is the percentage of hydroxyapatite with 0, 25, 40, and 50% (wt/v). The samples were characterized by using Fourier transform infrared (FTIR) spectroscopy, scanning electron microscope (SEM), compressive test, and swelling behavior. The results showed that addition of hydroxyapatite has yielded porous structure with average pore size of 42,39 μm (50% HA) and increased in compressive modulus from 14 MPa for 0% HA to 143, 191, and 187 MPa for samples with addition of HA with amount of 25, 40, 50% (wt/v). Besides, addition of HA also reduced the swelling ratio from 296% for sample without HA to 85, 78, and 59% for sample with addition of HA with the following amount: 25, 40, and 50% (wt/v), respectively. This results show that PVA/chitosan-HA in the current study is potential to be used as scaffold in bone tissue engineering.

]