

INTISARI

PENGARUH VARIASI JUMLAH DEKORASI DOPAN ION Ag⁺ PADA SINTESIS MATERIAL PERANCAH NANOKOMPOSIT HONEYCOMB/KARBONAT HIDROKSIAPATIT(HCB/CHA) UNTUK APLIKASI REKAYASA JARINGAN TULANG

Oleh

RATNASARI DEWI

18/427536/PA/18496

Perancah nanokomposit *honeycomb*/karbonat hidroksiapatit (HCB/CHA) terdekorasi ion Ag⁺ telah berhasil diproduksi dengan variasi konsentrasi volume Ag⁺ sebesar 1%; 2% dan 3% terhadap volume total larutan Ag⁺ dan CHA. Riset ini dilatar belakangi oleh adanya reaksi implan gigi dengan bakteri di dalam mulut sehingga menimbulkan penyakit. Tujuan dari penelitian ini yakni fabrikasi *scaffold* terdekorasi ion Ag⁺ untuk aplikasi rekayasa jaringan tulang dan menganalisa konsentrasu ion Ag⁺ yang ditambahkan. Adapun manfaat yang diharapkan dalam penelitian ini yaitu adanya potensi pada material yang dihasilkan sebagai kandidat implan tulang gigi. Metode penelitian dilakukan dengan memvariasi konsentrasi guna mengetahui kandungan ion Ag⁺, struktur kristal dan ketahanan sampel pada bakteri *Porphyromonas gingivalis* sehingga diperoleh hasil yang paling sesuai sebagai kandidat aplikasi rekayasa jaringan tulang. HCB/CHA diaduk bersama ion Ag⁺ selama 3 x 24 jam agar ion Ag⁺ dapat melekat. Karaterisasi dilakukan dengan *X-Ray Diffractometer* (XRD), *Fourier Transform Infrared* (FTIR), *Atomic Absorption Spectrophotometer* (AAS), dan Uji Antibakteri. Penambahan ion Ag⁺ memengaruhi mikrostrain, ukuran kristal dan daya hambat terhadap bakteri. Hasil XRD dikuatkan dengan hasil analisa FTIR menunjukkan penurunan ukuran kristal setelah dilakukan dekorasi ion Ag⁺, namun naik kembali ketika konsentrasi ion semakin tinggi. Daya hambat terhadap bakteri semakin besar seiring kenaikan konsentrasi ion Ag⁺.

Kata kunci: Karbonat hidroksiapatit (CHA), *honeycomb* (HCB), ion perak (Ag⁺), *Porphyromonas gingivalis*, variasi konsentrasi.

ABSTRAK

THE VARIATIONS EFFECT OF THE AMOUNT OF Ag⁺ DOPANTS DECORATION ON THE SYNTHESIS OF HONEYCOMB/CARBONATE HYDROXYAPATITE (HCB/CHA) NANOCOMPOSITE SCAFFOLDING MATERIALS FOR BONE TISSUE ENGINEERING APPLICATIONS

by

RATNASARI DEWI

18/427536/PA/18496

Honeycomb/carbonate hydroxyapatite (HCB/CHA) nanocomposite scaffold decorated with Ag⁺ ions has been successfully produced with a volume concentration variation of 1%; 2% and 3% from the total volume of Ag⁺ and CHA. This research was motivated by the reaction of dental implants with bacteria in the mouth, causing disease. This research aims to fabricate scaffold decorated with Ag⁺ ions for bone tissue engineering applications and analyze the concentration of added Ag⁺ ions. The expected benefits of this study are the potential for the material produced as a candidate for dental bone implants. The research method was carried out by varying the concentration to determine the content of Ag⁺ ions, crystal structure and sample resistance of *Porphyromonas gingivalis* bacteria to obtain the most suitable results as candidates for bone tissue engineering applications. HCB/CHA was stirred with Ag⁺ ions for 3 x 24 hours so that Ag⁺ ions could adhere. Characterization was carried out using X-Ray Diffractometer (XRD), Fourier Transform Infrared (FTIR), Atomic Absorption Spectrophotometer (AAS), and Antibacterial Test. The addition of Ag⁺ ions affects the microstrain, crystal size and inhibition of bacteria. The XRD results were corroborated by the results of the FTIR analysis showing a decrease in crystal size after the decoration of Ag⁺ ions but increased again when the ion concentration was higher. The inhibition against bacteria is getting bigger as the concentration of Ag⁺ ions increases.

Keywords: Carbonate hydroxyapatite (CHA), honeycomb (HCB), silver ion (Ag⁺), *Porphyromonas gingivalis*, concentration variation.