

Ilham Alif Furqon 2019. **Pelapisan Silver Nanopartikel (AgNPs) Pada Stainless Steel SS316L dengan Metode Spray Coating**. Skripsi dibawah bimbingan Dr. Aminatun, Ir., M.Si. dan Dyah Hikmawati S.Si., M.Si, Program Studi S-1 Teknik Biomedis, Departemen Fisika, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

Osteomyelitis merupakan infeksi pemasangan implan yang diakibatkan karena bakteri yang beradhesi ke permukaan implan biomaterial. Hal ini terjadi karena setelah proses implantasi akan ada persaingan antara integrasi material implan dalam jaringan (osteointegrasi) dan juga kemampuan bakteri untuk melekat ke permukaan biomaterial. Pada penelitian ini *silver* nanopartikel (AgNPs) digunakan sebagai lapisan material implan *Stainless Steel SS316L*. AgNPs didapatkan melalui proses sintesis secara kimia dengan metode reduksi *Gallic acid*. Karakterisasi larutan AgNPs dilakukan dengan uji Uv – Vis Spektrofotometer, dan *Particle Size Analysis* (PSA). Kedua uji tersebut menunjukkan nanopartikel perak telah terbentuk dengan rentang Panjang gelombang 400 – 450 nm dan distribusi ukuran sebesar 0,9 – 4,8 nm. Larutan AgNPs yang terbentuk disemprotkan pada SS316L dengan metode *spray coating* dengan 5 variasi konsentrasi prekursor: 0,1 mM, 1 mM, 10 mM, 100 mM. AgNPs yang terlapis pada substrat dikarakterisasi dengan menggunakan uji XRD, uji SEM, dan uji aktivitas anti bakteri. Analisis XRD menunjukkan substrat SS316L telah terlapis dengan Ag dengan prosentase pada rentang 6,5-19 % berstruktur kristal *cubical*. Berdasarkan uji aktivitas antibakteri semua variasi sampel lapisan berhasil mendapatkan diameter hambat pada rentang 12-16 mm, sehingga variasi konsentrasi precursor AgNPs-Gelatin 10 mM dapat dikembangkan menjadi pelapis pada permukaan material implan SS316L.

Kata kunci : Osteomyelitis, Nanomaterial, Perak, *Spray Coating*, *Stainless Steel SS316L*, Antibakteri

Ilham Alif Furqon 2019. **Coating of Silver Nanoparticles (AgNPs) on SS316L Stainless Steel with Spray Coating Method.** This thesis was supervised by Dr. Aminatun, Ir., M.Si. and Dyah Hikmawati S.Si., M.Si, Biomedical Engineering Undergraduate Program, Department of Physics, Faculty of Science and Technology, Universitas Airlangga.

ABSTRACT

Osteomyelitis is an infection of implant placement caused by bacteria that affect the surface of the biomaterial implant. This happens because after the implantation process, there will be competition between the integration of implant material in the tissue (osseointegration) and also the ability of bacteria to attach to the surface of the biomaterial. In this study, silver nanoparticles (AgNPs) were used as a coating on SS316L Stainless Steel implant material. AgNPs were obtained through a chemical synthesis process with the reduction method of Gallic acid. Characterization of AgNPs solution was carried out by Uv-Vis Spectrophotometer, and Particle Size Analysis (PSA). Both tests showed that silver nanoparticles have been formed with a wavelength range of 400 - 450 nm and size distribution of 0.9 - 4.8 nm. Formed AgNPs solution was sprayed on SS316L using spray coating method with 5 variations of precursor concentrations: 0.1 mM, 1 mM, 10 mM, 100 mM. The coated AgNPs on the substrate were characterized using XRD test, SEM test, and anti-bacterial activity test. XRD analysis showed that Ag was successfully coated SS316L substrate with a percentage in the range of 6.5-19% with a cubical crystal structure. Based on the antibacterial activity test, all variations of the layer samples succeeded in obtaining inhibitory diameters in the range of 12-16 mm, so that variations in the precursor concentration of AgNPs-Gelatin 10 mM could be developed into coatings on the surface of SS316L implant material.

Keywords : Osteomyelitis, Nanomaterial, Silver, *Spray Coating*, *Stainless Steel* SS316L, Antibacteri