ABSTRAK

Titanium dan paduannya telah banyak digunakan sebagai material implan gigi komersil karena sifatnya yang biokompatibel, tahan korosi, dan stabil secara kimiawi. Penelitian ini berfokus pada modifikasi permukaan implan gigi berbasis Ti6Al4V untuk meningkatkan sifat osseointegrasi melalui *pre-treatment* etsa, anodisasi, dan alkali-*heat treatment* dilanjutkan dengan pelapisan AgHA pada tegangan 5, 10, dan 15 volt menggunakan *electrophoretic deposition*. Hidroksiapatit (HA) memiliki struktur menyerupai gigi manusia dengan tambahan perak (Ag) mampu membantu meningkatkan osseointegrasi implan dan mencegah infeksi bakteri. Hasil menunjukkan variasi kekasaran dan keterbasahan permukaan untuk setiap variasi *pre-treatment* : etsa (75,25^{o} ; 0,23 µm), anodisasi (18,5^{o} ; 0,3 µm), alkali-*heat treatment* (12,25^{o} ; 0,31 µm). Dari ketiga variasi *pre-treatment* menyebabkan perubahan morfologi pada permukaan Ti6Al4V seperti terciptanya morfologi *flake, nanotube,* dan *hydrogel nanotube*. *Yield deposition* pelapisan AgHA tertinggi diperoleh pada spesimen *pre-treatment* etsa untuk setiap variasi tegangan 5, 10, dan 15 volt sebesar 2,6 mg/cm^2 4,5 mg/cm^2, dan 6,8 mg/cm^2. Lapisan AgHA pada spesimen hasil *pre-treatment* menujukkan rata, padat, dan berstruktur *sponge*. Rekomendasi modifikasi permukaan Ti6Al4V sebagai implan gigi menunjukkan bahwa struktur nanotube dan *hydrogel nanotube* dari hasil *pre-treatment* anodisasi dan alkali-*heat treatment* memiliki karakteristik kekasaran dan keterbasahan yang baik dilihat dari nilai BIC (*Bone Implant Contact)* penelitian terdahulu. Lapisan AgHA memiliki struktur *sponge* yang menunjukkan daya lekat yang baik, sehingga mendukung proses osseointegrasi tulang dan implan pada permukaan yang telah dilakukan *pre-treatment* anodisasi dan alkali-*heat treatment.*

Kata Kunci : *Ti6Al4V, Modifikasi Permukaan, AgHA, Implan Gigi*

ABSTRACT

Titanium and its alloys have been widely used as commercial dental implant materials due to their biocompatibility, corrosion resistance, and chemical stability. This research focuses on surface modification of Ti6Al4V-based dental implants to improve their osseointegration properties through pre-treatment of etching, anodization, and alkali-heat treatment followed by AgHA coating at 5, 10, and 15 volts using electrophoretic deposition. Hydroxyapatite (HA), which has a structure similar to human teeth, with the addition of silver (Ag) can help improve implant osseointegration and prevent bacterial infection. Results showed variations in surface roughness and wettability for each pre-treatment variation: etching (75,25^{o}; 0,23 µm), anodizing (18,5^{o}; 0,3 µm), alkali-heat treatment (12,25^{o}; 0,31 µm). The results of the existing surface morphology are shown through SEM observation. The highest AgHA coating deposition yield was obtained on the etching pre-treatment specimen for each voltage variation of 5, 10, and 15 volts at 2.6 mg/cm^2, 4.5 mg/cm^2, and 6.8 mg/cm2. The AgHA coating on pre-treated specimens shows uniform, dense, and sponge-like structure. The surface modification recommendation for Ti6Al4V as dental implant indicates that the nanotube and hydrogel nanotube structures resulting from anodization and alkali-heat treatment pre-treatments exhibit good roughness and wettability characteristics, as evidenced by the BIC (Bone Implant Contact) values from previous studies. The AgHA coating has a sponge-like structure that demonstrates good adhesion properties, thus supporting the osseointegration process between bone and implant on surfaces that have undergone anodization and alkali-heat treatment pre-treatments.

Keyword *: Ti6Al4V, Surface Modification, AgHA, Dental Implants*