

INTISARI

AISI 316L sering digunakan pada aplikasi biomedis khususnya bahan *implant* tulang karena memiliki harga yang murah dan mudah difabrikasi dari pada paduan titanium dan paduan koblat. AISI 316L memiliki ketahanan korosi sumuran yang buruk dari pada paduan titanium dan paduan koblat sehingga banyak menimbulkan kegagalan material. *Shot peening* merupakan salah satu perlakuan permukaan yang dapat meningkatkan sifat mekanik dan ketahanan korosi material. Elektroplating dapat menaikkan sifat mekanik dan ketahanan korosi karena adanya lapisan pada permukaan. Penelitian ini bertujuan mendapatkan pola kekasaran permukaan, kekerasan, *wettability*, dan bentuk struktur mikro pada penampang 316L serta ketahanan korosi sumuran pada media 0,9% NaCl pengaruh *shot peening*, elektroplating dan gabungan *shot peening* dan elektroplating.

Proses *shot peening* dilakukan pada permukaan 316L dengan durasi 2, 4, 10, 20 dan 30 menit menggunakan bola baja dengan diameter 0,6 mm serta kekerasannya 40-50 HRC. Pelapisan dasar nikel pada proses elektroplating Ni-Cr dilakukan dengan durasi 15 menit dilanjutkan pelapisan Cr berdurasi 0, 15, 20, 25 dan 30 menit.

Hasil penelitian menunjukkan bahwa pada perlakuan *shot peening* menaikkan kekasaran setelah 2 menit kemudian menurun kekerasannya dengan bertambahnya waktu. Kekasaran pada elektroplating meningkat dengan bertambahnya durasi electroplating. Kekasaran gabungan perlakuan *shot peening* dilanjutkan elektroplating lebih tinggi dari perlakuan *shot peening* atau elektroplating. Kekerasan pada perlakuan *shot peening* meningkat dengan penambahan waktu durasi. Kekerasan elektroplating meningkat sampai 20 menit, selanjutnya nilai kekerasannya menurun dengan bertambahnya durasi elektroplating sampai 30 menit. Nilai kekerasan gabungan perlakuan *shot peening* dilanjutkan electroplating paling tinggi. Perubahan ukuran butiran terjadi di permukaan pada perlakuan *shot peening*. Ketebalan elektroplating meningkat dengan bertambahnya waktu. Gabungan perlakuan *shot peening* dilanjutkan elektroplating memiliki ketebalan paling tinggi. Pola sudut kontak *wettability* pada perlakuan *shot peening*, electroplating serta gabungan perlakuan *shot peening* dilanjutkan elektroplating dipengaruhi oleh kekasaran. Laju korosi maksimum sebesar 1,233 mpy berada pada durasi *shot peening* 2 menit, kemudian laju korosi menurun dengan bertambahnya durasi *shot peening*. Laju korosi minimum sebesar 0,175 mpy berada pada durasi elektroplating 20 menit. Material gabungan *shot peening* dan elektroplating lebih rentan terjadi korosi sumuran dari pada material perlakuan *shot peening*.

Kata Kunci: *Shot peening*, elektroplating Ni-Cr, *wettability*, korosi sumuran

ABSTRACT

AISI 316L is often used in biomedical applications especially bone implant materials because it is cheap and easily fabricated from titanium alloys and cobalt alloys. AISI 316L has poor corrosion resistance from titanium alloy and cobalt alloy causing many failure materials. Shot peening is one of the surface treatments can improve the mechanical properties and corrosion resistance of the material. Electroplating can increase the mechanical properties and corrosion resistance due to the presence of layers on the surface. The aim of this research is to get effect shot peening, electroplating and combined of shot peening and electroplating toward surface roughness pattern, hardness pattern, wettability pattern, and micro structure shape at 316L cross section and corrosion resistance of 0.9% NaCl.

The peening shot process was performed on a 316L surface with duration of 2, 4, 10, 20 and 30 minutes using steel balls with a diameter of 0.6 mm and hardness of 40-50 HRC. The nickel base plating of the Ni-Cr electroplating process was carried out with duration of 15 minutes followed by Cr coating duration of 0, 15, 20, 25 and 30 minutes.

The results show that shot peening lead to improved roughness after 2 minutes then decrease the roughness with increasing time. The surface roughness of electroplated sample increases with increasing electroplating duration. The surface roughness combined of shot peened and electroplated sample are higher than shot peened sample or electroplated sample. The hardness value of the shot peened sample increases with the addition of the duration time. The hardness electroplated sample increases for up to 20 minutes and then the hardness value decreases with increasing electroplating duration up to 30 minutes. The hardness of combined shot peened and electroplated sample is highest. Grain size changes occur on the surface of the shot peened sample. Electroplating thickness increases with increasing electroplating duration. Combined shot peening and electroplating treatment are the highest thickness. The Wettability angle of contact for shot peened sample , electroplated sample and combined shot peened and electroplated sample is affected by surface roughness. The highest corrosion rate of 1,233 mpy is achieved by shot peening duration of 2 minutes, then the corrosion rate decreases with the increasing of shot peening duration. The lowest corrosion rate of 0.175 mpy is the electroplating duration of 20 minutes. Combined shot peening and electroplating materials is more susceptible to pitting corrosion than shot peening treatment materials.

Keywords: Shot peening, electroplating Ni-Cr, wettability, pitting corrosion