



DAFTAR PUSTAKA

- Abdulmalik, S. S., 2012, *Effect of Zinc Addition on The Properties of Magnesium Alloys*, Thesis, University Technology Malaysia.
- Ahmed, A. A., Mhaede, M., Basha, M, Wollmann, M., and Wagner, L., 2015, The effect of shot peening parameters and hydroxyapatite coating on surface properties and corrosion behavior of medical grade AISI 316L stainless steel. *Surface and Coatings Technology* 280 (PC): 347-358.
- Ahmed, A. A., Mhaede, M. ,Wollmann, M., and Wagner, L.. 2014. Effect of Surface and Bulk Plastic Deformations on the Corrosion Resistance and Corrosion Fatigue Performance of AISI 316L. *Surface and Coatings Technology* 259 (PC): 448–55.
- Arifvianto, B., Suyitno, Mahardika, M., Dewo, P., Iswanto, P. T., and Salim, U. A., 2011, Effect of surface mechanical attrition treatment (SMAT) on microhardness, surface roughness and wettability of AISI 316L. *Materials Chemistry and Physics*, 125, 418–426.
- ASM Handbook, 2003, Volume 23, *Materials for Medical Devices*, ASM International, United States of America.
- ASM Handbook, 1987, Volume 13, *Corrosion*, ASM International, United States of America.
- ASM Handbook, 1994, Volume 11, *Failure Analysis and Prevention*, ASM International, United States of America.
- ASM Handbook, 1994, Volume 5, *Surface Engineering*, ASM International, United States of America.
- ASTM Standard (G 46-99), 1999, *Standard guide for Examination and Evaluation of pitting corrosion*, ASTM, Philadelphia
- Atanda, P., Fatudimu, A., and Ouwole O., 2010, Sensitisation Study of Normalized 316L Stainless Steel, *Journal of Minerals & Materials Characterization & Engineering*, 9 (1), 13-23.



- Azar, V., B. Hashemi, R. Yazdi, and Mahboobeh, 2010, The Effect of Shot Peening on Fatigue and Corrosion Behavior of 316L Stainless Steel in Ringer's Solution, *Surface and Coatings Technology* 204, 21–22.
- Bagherifard, S., Slawik, S., Pariente, I.F., and Pauly, C., 2016, Nanoscale Surface Modi Fi Cation of AISI 316L Stainless Steel by Severe Shot Peening. *JMADE* 102, 68–77.
- Baier, R. E., Shafrin, E. G. and Zisman, W. A., 1968, Adhesion: Mechanisms That Assist or Impede It. *Science* 162 (860): 1360–1368.
- Barker, D. and Walsh, F.C., 1991, Applications of Faraday's Laws of Electrolysis in Metal Finishing, *Transactions of the IMF* 69(4), 158–162.
- Biehler, J., Hoche, H. and Oechsner, M., 2017, Corrosion Properties of Polished and Shot-Peened Austenitic Stainless Steel 304L and 316L with and without Plasma Nitriding. *Surface and Coatings Technology* 313, 40–46.
- Bos, R., Mei, H. C. V. D., and Busscher, H. J., 1999, Physico-Chemistry of Initial Microbial Adhesive Interactions - Its Mechanisms and Methods for Study, *FEMS Microbiology reviews*, 23, 179-230.
- Cahya, S., Ikhlasan, M., Kartika, I., 2014, Karakteristik Material Biokompetibel Aplikasi Implan Medis Jenis Bone Plate. *Seminar Nasional Sains dan Teknologi 2014* ISSN: 2407-1846.
- Calister, Jr. William D., and David G. Rethwisch. 2014. *Materials Science*. 9th ed. ed. Daniel Sayre. the United States of America: Wiley.
- Carvalho, A.L.M dan Voorwald, H.J.C., 2007, Influence of shot peening and hard chromium electroplating on the fatigue strength of 7050-T7451 aluminum alloy, *Journal of Fatigue*, 29, 1282-1291.
- Chang, K.C., Lin, H.F., Lin, Y.L., Kuo, T.H., Huang, H.H., Hsu S.C., Yeh,J.M., Yang, J.C. and Yu, H.Y., 2008, Effect of Amino-Modified Silica Nanoparticles on the Corrosion Protection Properties of Epoxy Resin-Silica Hybrid Materials, *Journal of Nanoscience and Nanotechnology*, 8(6), 3040–3049.



- Cheng, C., Klinkenberg, L., Ise, Y., Zhao, J., Tada, E., and Nishikata, A., 2017, Pitting Corrosion of Sensitised Type 304 Stainless Steel Under Wet–Dry Cycling Condition, *Corrosion Science*, 118, 217–226.
- Chung, C. K., Chang, W. T. and Hung, S. T., 2010, Electroplating of Nickel Films at Ultra Low Electrolytic Temperature, *Microsystem Technologies* 16(8–9), 1353–1359.
- Destyorini, F. , Sugiarti, E. and Thosin, K.A.Z., 2013. Pelapisan NiCo / Cr Dengan Gabungan Teknik Elektroplating Dan Pack-Cementation Untuk Meningkatkan Ketahanan Korosi Dan Kekerasan Baja Karbon Rendah, *Jurnal Ilmu Pengetahuan dan Teknologi* 31(4) 51–58.
- Dieter, E. dan Bacon, D., 1987, *Mechanical Metallurgy* 3rd ed., Mc Graw-Hill Book Co., New York
- Elansezhan, R., Ramamoorthy, B. and Nair, P.K., 2008, Effect of Surfactants on the Mechanical Properties of Electroless (Ni-P) Coating, *Surface and Coatings Technology* 203(5–7), 709–712.
- Elias, C. N., Oshida, Y., Lima,J.H.C. and Carlos Alberto Muller. 2008. Relationship between Surface Properties (Roughness, Wettability and Morphology) of Titanium and Dental Implant Removal Torque. *Journal of the Mechanical Behavior of Biomedical Materials* 1(3): 234–42.
- Eustathopoulos, N., Sobczak, N., Passerone, A. and Nogi, K., 2005, Measurement of Contact Angle and Work of Adhesion at High Temperature, *Journal of Materials Science* 40(9–10), 2271–2280.
- Fargas, G., Roa,J. J. and Mateo, A., 2015, Effect of Shot Peening on Metastable Austenitic Stainless Steels, *Materials Science and Engineering A* 641, 290–296.
- Folkhard, E. ,1998, *Welding metallurgy of stainless steel*. Springer Verlag, New York.
- Fontana, M.G., 1986, *Corrosion Engineering*, 3rd ed., Mc Graw Hill Company, New York



- Grachev, V., Nechaev, I. , Rozen, A. E. and Rozen, A.A., 2017, Mechanism of Pitting Corrosion Protection of Metals and Alloys in New-Generation Water Treatment Plants, *MATEC Web of Conferences* 132, 10–15.
- Grainger, S. dan Blunt, J., 1998, *Engineering Coatings - Design and Application*, Abingdon Publishing, Cambridge.
- Han, T. Y., Shr, J. F. , Wu, C. F. and Hsieh, C. T., 2007, A Modified Wenzel Model for Hydrophobic Behavior of Nanostructured Surfaces, *Thin Solid Films* 515(11), 4666–4669.
- Hao, Y. W., Bo, D., Cheng, Z., Ming J. Y., and Jin, L., 2009, Effect of Surface Mechanical Attrition Treatment on Corrosion Behavior of 316 Stainless Steel, *Journal of Iron and Steel Research International*, 16(2), 68–72.
- Hashemi, B., Yazdi, M. R. and Azar, V., 2011, The Wear and Corrosion Resistance of Shot Peened-Nitrided 316L Austenitic Stainless Steel, *Materials and Design* 32(6), 3287–3292.
- Huang, C. A., Lin, C. K. and Chen, C. Y., 2009, Hardness Variation and Corrosion Behavior of as-Plated and Annealed Cr-Ni Alloy Deposits Electroplated in a Trivalent Chromium-Based Bath, *Surface and Coatings Technology* 203(24), 3686–3691.
- Huang, C. A., Chuang, C. H., Li, C.H. and Hsu, F. Y., 2015, Effect of the Cu-Substrate Thickness on the Hardness Variation of Flame-Heated Cr-C Deposits, *Vacuum* 120, 2–7.
- Humphreys, F.J., and Hatherly, M., 2013, Recrystallisation and Related Annealing Phenomena, *Journal of Chemical Information and Modeling* 53(9), 1689–1699.
- Hyie, K. M., Zabri, M. Z., Roseley, N. R. N. and Masdek, N. R. N. M., 2016, Effect of Deposition Time on Wear and Corrosion Performance of Co-Ni-Fe Alloy Coated Mild Steel, *Journal of Materials Research* 31(13), 1848–1856.
- Iswanto, P.T., Malau, V., Priyambodo, B. H., Wibowo, T. N. and Amin, N., 2017. Effect of Shot-Peening on Hardness and Pitting Corrosion Rate on Load-Bearing Implant Material AISI 304. *Materials Science Forum* 901 MSF, 91–96.



- Jiang, J. and Arnell, R., 2000, The Effect of Substrate Surface Roughness on the Wear of DLC Coatings, *Wear* 239(1), 1–9.
- Jinlong, L., Guo, W., Liang, T., Yang, M., 2017, The Effects of Ball Milling Time and Surface Enriched Chromium on Microstructures and Corrosion Resistance of AISI 304 Stainless Steel. *Journal Materials Chemistry and Physics*.
- Lippold, J. C. and Kotecki, D. J., 2005, *Welding Metallurgy and Weldability of Stainless Steels*. Wiley Interscience, A John Wiley & Sons, Inc., Publication.
- Jones, D. A., 1996, *Principles and Prevention of Corrosion*, Prentice-Hall International, United States of America.
- Ketz, F., Gacsi, Z., Kovacs, J. and Pieczonka, T., 2004, The electroless deposition of Nickel on SiC particles for Aluminium Matrix Composite. *Surface and Coating technology* 180-181, 575-579
- Kim, Jip, J. and Young, Y. M., 2013, Study on the Passive Film of Type 316 Stainless Steel *International Journal of Electrochemical Science* 8(10),11847–11859.
- Maliwemu, E. U. K., Malau, V. and Iswanto, P. T., 2018, Effect of Shot Peening in Different Shot Distance and Shot Angle on Surface Morphology, Surface Roughness and Surface Hardness of 316L Biomaterial, *IOP Conference Series: Materials Science and Engineering* 299, 12051.
- Kou, S., 2003, *Metallurgy Second Edition Welding Metallurgy*, A John Wiley & Sons, Inc, United States of America.
- Kumar, H., Singh, S., Kumar, P., 2013, Modified Shot Peening Processes, *International Journal of Engineering Sciences & Emerging Technologies*, 5 (1), 12-19.
- Lee, H., Kim, D., Jung, J., Pyoun, Y., Shin, K., 2009, Influence of peening on the corrosion properties of AISI 304 stainless steel. *Journal Corrosion Science*, 51 (12) 2826–2830.
- Lee, S. H. and So, M.G., 2000, Effects of Deposition Temperature and Pressure of the Surface Roughness and the Grain Size of Polycrystalline Si 1 – X Ge X



Films, *Journal of Materials Science* 35(19), 4789–4794.

- Lin, C.T., and Lin, K.L., 2004, Effects of Current Density and Deposition Time on Electrical Resistivity of Electroplated Cu Layers, *Journal of Materials Science: Materials in Electronics* 15(11), 757–62.
- Liu, Y.G., Li, M.Q., Liu, H.J. ,2017, Nanostructure and surface roughness in the processed surface layer of Ti-6Al-4V via shot peening. *Materials Characterization*, 123, 83-90.
- Jinlong, L., Guo, W., Liang, T. and Yang, M., 2017, The Effects of Ball Milling Time and Surface Enriched Chromium on Microstructures and Corrosion Resistance of AISI 304 Stainless Steel, *Materials Chemistry and Physics* 197, 79–86.
- Medeliene, V., and Matulionis, E., 2002, Morphology and Corrosion Properties of Electroplated Ni-Cr Alloy Coatings in Salt Solutions, *Protection of Metals* 38(3), 238–42.
- Menezes, M. R., Godoy, C., Buono, V. T. L., Schwartzman, M. M. M., and Wilson, J. C. A. B., 2016, Effect of Shot Peening and Treatment Temperature on Wear and Corrosion Resistance of Sequentially Plasma Treated AISI 316L Steel, *Surface and Coatings Technology* 309, 651–662.
- Moniruzzaman, M., Rakib, M. M., and Matin, F. T., 2012, Cr-Ni Alloy Electrodeposition and Comparison with Conventional Pure Cr Coating Technique, *International Journal of Automotive and Mechanical Engineering*, 6 (1).692-700.
- Mudali, U. K., Sridhar, T. M., and Raj, B., 2003, Corrosion of Bio Implants. *Journal Sadhana* 28. 601-637.
- Mulyaningsih, N., 2013, *Pengaruh Waktu Electroplating Nikel-Chrom Terhadap Kekerasan dan Laju Korosi Dalam Media Cairan PBS Stainless Steel 304*, Tesis, Departemen Teknik Mesin dan Industri, UGM, Yogyakarta.
- Mulyaningsih, N., Salahudin, X., Iswanto, P. T. and Soekrisno. 2014Analisis Perbandingan Laju Korosi Material Ss 304 Lapis Ni-Cr Dengan SS 316 L Teriiadap Pengaruh Cairan Tubuh . *Universitas Tidar Magelang* 40(2), 95–107.



- Muthukumaran, V., Selladurai, V., Nandhakumar, S., and Senthilkumar, M., 2010, Experimental investigation on corrosion and hardness of ion implanted AISI 316L stainless steel. *Journal Materials and Design*, Vol. 31, 2813–2817
- Navaser, M. and Atapour, M., 2017, Effect of Friction Stir Processing on Pitting Corrosion and Intergranular Attack of 7075 Aluminum Alloy, *Journal of Materials Science and Technology* 33(2), 155–65.
- Panagopoulos, C. N. and Georgiou, E. P., 2010, Cold Rolling and Lubricated Wear of 5083 Aluminium Alloy.” *Materials and Design* 31(3), 1050–1055.
- Peyre, P., Scherperel, X., Berthe, L., Carboni, C., Fabbro, R., Beranger, G., and Lemaitre, 2000, Surface Modifications Induced in 316L Steel by Laser Peening and Shot-Peening. Influence on Pitting Corrosion Resistance, *Materials Science and Engineering A* 280(2), 294–302.
- Portinha, A., Teixeira, V., Carneiro, J., Martins, J., Costa, M. F., Vassen, R. and Stoever, D., 2005, Characterization of Thermal Barrier Coatings with a Gradient in Porosity, *Surface and Coatings Technology* 195(2–3), 245–51.
- Pudyaswati, 2015, *Statistik Transportasi DKI Jakarta 2015*. Badan Pusat Statistik Provinsi DKI Jakarta.
- Quere, D., 2008, Wetting and Roughness, *The Annual Review of Materials Research*, 71-99.
- Raharjo, R., Widodo, T.D., Kusumaningsih, H., & Rizky, E.R., 2015, Modifikasi kekerasan baja tahan karat aisi 316l dengan menggunakan proses steel ball peening. *Proceeding Seminar Nasional Tahunan Teknik Mesin XIV*, Vol. 30, (SNTTM-XIV).
- Roberge, P.R., 2008, *Corrosion Engineering Principle and Practice*, Third edition, Mc Graw-Hill Company, New York.
- Rudianto, R, 2015, Tingkat Kekasaran Permukaan Stainless Steel 316L Akibat Tekanan Steelballpeening. *Proceeding Seminar Nasional Tahunan Teknik Mesin XIV (SNTTM XIV)*.
- Saitou, M. 2010. A Study on the Surface Roughness of Electrodeposited Silver Thin Films Using a Confocal Laser Scanning Microscope. *Microscopy : Science, Technology, Application and Education*: 2035–42.



- Sambodo, W. A. dan Setianingrum, A., 2015, Pengaruh perlakuan shot peening dan electroplating Ni-Cr pada AISI 304 terhadap laju korosi dalam larutan synthetic body fluid (SBF). *Seminar Nasional Sains dan Teknologi 2015* ISSN : 2407-1846.
- Shen, L. , Wang, L., Wang, Y. and Wang, C., 2010, Plasma Nitriding of AISI 304 Austenitic Stainless Steel with Pre-Shot Peening, *Surface and Coatings Technology* 204(20), 3222–3227.
- Smithells, C. J., 1976, *Metals Reference Books* , 5th edition, Butterworth. London & Boston.
- Stalder, A. F., Kulik, G., Sage, D., Barbieri, L. and Hoffmann, P., 2006, A Snake-Based Approach to Accurate Determination of Both Contact Points and Contact Angles, *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 286(1–3), 92–103.
- Stalder, A. F., Melchior, T., Muller, M., Sage, D., Blu, T. and Unser, M., 2010. Low-Bond Axisymmetric Drop Shape Analysis for Surface Tension and Contact Angle Measurements of Sessile Drops, *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 364(1–3), 72–81.
- Suarsana, I. K., 2008, Pengaruh Waktu Pelapisan Nikel Pada Tembaga Dalam Pelapisan Khrom Dekoratif Terhadap Tingkat Kecerahan Dan Ketebalan Lapisan, *Jurnal Ilmiah Teknik Mesin Cakram*, Volume 2, No.1. pp 1-5.
- Subangga, B. T., Sutikno, E. and Ariseno, A., 2011, Pengaruh Variasi Anoda Dan Waktu Pelapisan Elektroplating Terhadap Laju Keausan Grinding Ball, *Prosiding Seminar Nasional Sains dan Teknologi 2*.
- Subramanian, C, and Palaniradja, K., 2015, Effect of Surfactant on the Electroless Ni-P/Ni-B Duplex Coatings on Aluminium 7075, *International Journal of Metallurgical Engineering* 4(2), 25–32.
- Sukrawani, Y., 2016, Analisis Variasi Waktu Proses Hard Chrome Terhadap Kekerasan Dan Ketebalan Lapisan Pada Besi Cor Kelabu, *TORSI* 1(1).
- Sunardi, Iswanto, P.T. & Mudjijana, 2015, Peningkatan Ketahanan Korosi Pada Material Biomedik Plat Penyambung Tulang SS 304 Dengan Gabungan



Metode Shot Peening dan Electroplating Ni-Cr. *Jurnal Ilmiah Semesta Teknika*, Vol.18, No.2,160-167.

Susanto, E. E., Anang., S., and Aditya, D. E., 2017, Analisis Tegangan Dan Waktu Pada Proses Electroplating Nikel - Krom Terhadap Tebal Lapisan, *Jurnal Flywheel* 4(2), 1–11.

Susita, L., Sudjatmiko, R. M., Sujitno, T., Darsono, Sulandari, S. and Supardjono, 1996, Karakteristik struktur mikro stainless-steel hasil implantasi ion nitrogen. *Prosiding pertemuan dan presentasi ilmiah PPNY-BATAN Yogyakarta*.

Suwinarsi., 1994, Hubungan Antara Masa Zat Yang Terbentuk Dengan Waktu Dalam Proses Elektroplating. *Undip Semarang*.

Suyitno, Arifvianto, B., Widodo, T. D., Mahardika, M., Dewo, P., and Salim, U. A., 2012, Effect of cold working and sandblasting on the microhardness, tensile strength and corrosion resistance of AISI 316L stainless steel, *International Journal of Minerals, Metallurgy, and Materials* 19(12), 1093 .

Rad, T., Armin, Hashjin, M.. S., Osman, N. A. A. and Faghihi, S., 2014, Improved Bio-Physical Performance of Hydroxyapatite Coatings Obtained by Electrophoretic Deposition at Dynamic Voltage, *Ceramics International* 40, 12681–12691.

Tjipto, S and Sulamdar, S., 1996, Karakterisasi Struktur Mikro Stainless-Steel Hasil Implantasi Ion Nitrogen, *Prosiding Pertemuan dan Presentas IImliah*, 50-56.

Toloei, A., Stoilov, V. and Northwood, D., 2013, The Relationship Between Surface Roughness and Corrosion, *Volume 2B: Advanced Manufacturing* .

Trethewey, K.R. terj Widharto, 1991, *Korosi Untuk Mahasiswa dan Rekayasa*, PT. Gramedia Pustaka Utama, Jakarta.

Uelzen, T. dan Müller, J., 2003, Wettability enhancement by rough surfaces generated by thin film technology. *Thin Solid Films* 434



- Umardhani, Y. dan Suprihanto, A., 2013, Pengembangan Metode Peningkatan Kekerasan Baja Tahan Karat AISI 316L Lewat Proses Nitridasi Gas Temperatur Tinggi. *Jurnal Rotasi*, 15, 7-10.
- Umemoto, M., 2003, Nanocrystallization of Steels by Severe Plastic Deformation, *Materials Transactions, The Japan Institute of Metals*, 44(10), 1900-1911.
- Voort, V. and Baldwin, W., 2004, Metallography and Microstructures Handbook., *ASM International* 9: 2733.
- Wang, X.Y., and Li, D.Y., 2002, Mechanical and Electrochemical Behavior of Nanocrystalline Surface of 304 Stainless Steel, *Electrochimica Acta* 47(24), 3939–3947.
- Wessling, B., 1994, Passivation of Metals by Coating with Polyaniline : Corrosion Potential Shift and Morphological Changes, *Advanced Materials* 226(11), 7–12.
- Whitehouse, D. J., 1994, *Handbook of surface and nanometrology 2nd ed*, University of Warwick Coventry, UK, ISBN 978-1-4200-8201-2.
- Wibowo, T. N., Iswanto, P. T., Priyambodo, B. H., and Amin, N., 2016, Pengaruh Variasi Waktu Shot Peening terhadap Struktur Mikro dan Kekerasan Permukaan Pada Material Implan Aisi 304, *Jurnal ROTOR*, 2, 70-73.
- Wilson, C. J., Clegg, R. E., Leavesley, D. I. and Pearcy, M. J., 2005, Mediation of Biomaterial–Cell Interactions by Adsorbed Proteins: A Review, *Tissue Engineering*, 11(1–2), 1–18.
- Wirjoadi, Susita, L., Siswanto, B., Sudjatmoko, 2013, Pengaruh Proses Nitridasi Ion pada biomaterial terhadap kekerasan dan ketahanan korosi. Prosiding Pertemuan dan resentasi Ilmiah Teknologi Akselator dan Aplikasinya. 13, 25-36.
- Xie, L., Jiang, C., Lu, W., Feng, Q., Wu, X., 2011, Investigation on The Surface Layer Characteristics of Shot Peened Titanium Matrix Composite Utilizing X-Ray Diffraction. *Surface & Coatings Technology*, Vol. 206, No. 2-3, pp. 511-516.
- Yu, S., Liu, D., Cui,T. and Zhang, X., 2015, Formation Process and Cross-Sectional Hardness of a Cr-Alloyed Layer on Ti6Al4V Alloy, *Materials*



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KOROSI SUMURAN DALAM MEDIA INFUS 0,9% NaCl PADA BAJA TAJAN KARAT 316L

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Zhang, H., Liu, L., Bai, J. and Liu, X., 2015, Corrosion Behavior Andmicrostructure of Electrodeposited Nano-Layered Ni-Cr Coatings, *Thin Solid Films*, 595, 36–40