

Widyariset

Abstrak dan Kata kunci bersumber dari artikel. Lembar abstrak ini boleh difotokopi tanpa izin dan biaya

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INFLUENCE OF CARBON AND NITROGEN ADDITION ON THE CORROSION RESISTANCE OF Co-28Cr-6Mo-0,8Si-0,8Mn-0,4Fe-0,2Ni ALLOYS

Widyariset Vol. 4, No.1, Mei 2018, page: 1–8

Abstract

Cobalt alloys is one of the implant materials that is used in orthopedic and dentistry, because of its biocompatibility, good mechanical properties, and high corrosion resistance. The mechanical properties and corrosion resistance can be enhanced by thermomechanical treatment and addition of alloying element. Carbon and nitrogen were added to enhance mechanical properties and high corrosion resistance. Effect of carbon variation and nitrogen to the corrosion resistance in Co-Cr-Mo (CCM) alloys were measured by corrosion measurement system (CMS) device in Hank's Solutions after thermomechanical treatment process. Corrosion rate of Co-Cr-Mo alloys with carbon variation dropped to 5.8×10^{-4} mmpy and 5.2×10^{-4} mmpy with carbon variation and nitrogen. Decreasing corrosion rate indicated that the corrosion resistance of alloys is increased with the addition of carbon and nitrogen.

Keywords: Co-Cr-Mo alloys, Carbon, Nitrogen, Corrosion rate, Corrosion resistance

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CORROSION RATE AND MORPHOLOGY OF POROUS METAL ALLOY Mg-Ca-Zn WITH CaCO₃ AS FOAMING AGENT

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Abstract

Magnesium alloy is a material that has been developed as a biodegradable implant material in orthopedic applications. Magnesium alloys have good biocompatibility, biodegradability, and good mechanical properties which make them have the potential to be used as a biomedical material. The main objective of this paper is to investigate corrosion rate and morphology after corrosion of biocompatibility of implant-based alloys Mg-Ca-Zn with CaCO₃ foaming agent. Mg-Ca-Zn Alloy was made by the method of powder metallurgy with the addition of CaCO₃ as a foaming agent with three variations of composition (96Mg-Ca-3Zn-CaCO₃, 91Mg-Ca-3Zn5CaCO₃, and 86Mg-Ca-3Zn-10CaCO₃ wt%). Sintering process was carried out at 600 °C and 650 °C with a holding time of five hours. Corrosion test was performed using G750 Gamry Instrument in accordance with ASTM standard G5-94. Simulated body fluid electrolyte used is Hank's solution with a pH value of 7.4 and a temperature of 37 °C. Then the analysis of the microstructure after corrosion test was conducted using scanning electron microscopy (JEOL, JSM-6390A Japan) equipped with energy dispersive spectrometry data (EDS). Alloy corrosion rate of Mg-Ca-Zn-CaCO₃ increases with the amount of CaCO₃ in the alloy and the temperature rise in the sintering. From the test results, the smallest corrosion rate is in the alloy 91Mg-Ca-3Zn-CaCO₃ at 600 °C sintering (58.3045

mpy) and the highest occurs in alloy 86Mg-Ca-3Zn-10CaCO₃ at 650 °C sintering (91.4007 mpy). Surface morphology of the alloy after the corrosion process is the type of volcano. This localized corrosion occurs where an electrochemical reaction takes place to form a distinctive structure with a circle and a hole in the middle.

Keywords: Mg alloys, Biodegradable, Powder metallurgy, Porous metals, Corrosion rate

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THE EFFECT OF SURFACE ROUGHNESS AND STIRRING SPEED ON THE COATING CHARACTERISTICS OF MARTENSITIC ELECTROLESS Ni-P

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Abstract

Coating process of martensitic stainless steel 420 (SS 420) as the base material component of the steam turbine blade component uses an Electroless Ni-P coating process. This process is one of the solution coatings that applied to stainless steel as a substrate to improve corrosion resistance. The goal of this research is to get an idea and information about the effect of surface roughness and stirring speed on the characteristics of Electroless Ni-P layer. Experimental parameters in this research were variations of 0.044 μm, 0.056 μm, 0.101 μm, and 0.164 μm surface roughness and variations of 4.9 rpm, 11.3 rpm, and 21.3 rpm stirring speed. Results showed that the surface roughness and low stirring speed causes the grain distribution becomes more uniform, which is shown by Scanning Electron Microscopy (SEM) examination. Adhesion layer also increases along with increasing levels of surface roughness. The highest value of adhesion was 1.9 MPa at 0.164 μm and the lowest value of adhesion was 0.8 MPa at 0,044 μm.

Keywords: Stainless steel, Martensitic, Electroless Ni-P, Corrosion resistance, Adhesion

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A STUDY OF STRESS CORROSION CRACKING RESISTANCE FOR COLD FORMING PLASTIC DEFORMED Cu-30Zn ALLOY

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Abstract

Cu-30Zn alloy has good atmospheric corrosion resistance. It is mainly used as automotive radiator cores, ammunition component, lamp fixture, flashlight shells and kickplates. Cold rolled Cu-30Zn with deformation degree 33,87% at 300 C was tested its Stress Corrosion Cracking (SCC) property. Stress corrosion cracking (SCC) of a Cu-30Zn has been investigated using Mattsson solutions 0,5 M (NH₄)₂SO₄ +0,05 M CuSO₄ in room temperature by using a constant load method. Cu-30Zn has a weakness on stress corrosion cracking in ammonia environment (mattson solution). Scanning electron microscope (SEM) testing indicated the failure of cold roll Cu-30Zn was a transgranular cracking. Furthermore, cracking occurred at stress below yield stress. Energy dispersive Spectroscopy (EDS) test exhibited dezincification indication on fracture surface. The visual examination of surface morphology on alloy showed discoloration from yellow to red. Homogenized Cu-30Zn showed better SCC resistance than cold rolled Cu-30Zn.

Keywords: Cartridge brass, Cold rolled, Mattson solution, Stress corrosion cracking, Transgranular

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WASTEWATER SPECIFIC EMISSION FACTOR FROM COMMUNAL WASTEWATER TREATMENT PLANT (WWTP)

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Abstract

Greenhouse gasses (GHG) that are produced by anaerobic digestion of wastewater consists of CH_4 gas and NO_2 gas. Besides the data of specific activity, the data of specific emission factor also plays an important part to determinate GHG emission. The research aim is to know the specific emission factor value from communal wastewater treatment plant (WWTP), as an input to determinate GHG emission for calculation of GHG emission reduction rate. The data was collected by taking the sample of BOD, CH_4 gas, and CO_2 gas from communal WWTP's. Sampling location were communal WWTP's in Jakarta City, Bandung City, and Yogyakarta City. Those WWTP's using anaerobic baffle reactor as their treatment system with capacity varied between 40-200 EP. The measured parameters were BOD and CH_4 . The samples were take using grab sampling in the morning and evening. The data was analyzed by quantitative methods. The specific emission factor value was determined from CH_4 gas measurement which is affected by wastewater treatment unit dimension, gas catcher chamber, and air suction pump capacity. The analysis results showed specific emission factor for communal WWTP's from the three cities is 0.00171 kg CH_4 /kg BOD. The value has big difference when compared to IPCC's default value that is 0.48 kg CH_4 /kg BOD. This is due to the formation of CH_4 and CO_2 gas that strongly influenced by an environmental condition in real time condition. This factor is not taken into consideration in IPCC's default.

Keywords: Specific factor emission, Greenhouse gasses, Domestic wastewater, Communal WWTP

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VISION SYSTEM DEVELOPMENT IN ECCENTRICITY TESTING FOR kWh METER UPPER BEARING

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Abstract

Eccentricity measurement techniques are developed to ensure optimization of operational works, either for large or small objects such as upper bearing kWh meter. Small object eccentricity testing has been done by using precise and sensitive touch trigger probing and a special software that makes it expensive. This study developed a more economical vision system in eccentricity testing. It consists of bearing holder and CCD microscope as an image recorder and computerized image processing. It uses three tested bearing during image recording process, which obtained 12 images from each tested bearing taken from every 30 angle, and one image as registration reference. Image registration process is conducted to correct imperfections bearing mounting into its holder and use centroid method to test the eccentricity of upper bearing kWh meter. This study is succeed in making an eccentricity testing prototype of upper bearing kWh meter which obtained result of 2nd bearing has its largest standard deviation. From all standard deviation value obtained that x-axis (horizontal) standard deviation is larger than y-axis (vertical) which means that detection of x direction is more accurate than y direction. To enhance precision image acquisition in the next study, it is expected the use of a computer system with homogeneous illumination is enabled.

Keywords: Upper bearing, kWh meter; Vision system, Image registration, Centroid, Standard deviation

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LOCAL MATERIAL TESTING FOR PAVEMENT MATERIAL ON REMOTE AND OUTMOST ISLAND

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Abstract

Road infrastructure development in remote and outmost islands such as Mentawai, Aru, and Morotai faced a problem i.e. difficulty in the availability of standard material. The standard material had to be transported from other areas that taking a long time and high cost of transportation. In fact, the three islands had abundant materials. However, there was no study conducted to examine the properties of the local material. The study aim was to find out the physical properties of pavement material that will be the basis of pavement design. The research began with the selection of material, discussion with experts, coordination with involved parties, site observation, and laboratory test. The analysis of testing result used comparative analysis that compared test result

to certain standard. Based on the analysis, local material from Mentawai Islands was suitable for foundation layer with cement stabilization 6%. Coral from Aru Island and limestone from Momojiu Morotai Island could also be utilized for foundation layer. Limestone from Rau Morotai Island utilized for asphalt mixture. Sand from Aru Island and sea sand from Morotai Island could be used for asphalt mixture and concrete cement mixture.

Keywords: Deposit, Foundation layer, Local material, Standard material, Substandard material

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MODELING OF SEPTIC TANKS SEEPAGE NEAR DUG WELLS IN MARGAHAYU VILLAGE, BANDUNG REGENCY

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Abstract

Dense settlements have an impact on pollution, one of which is domestic pollution which results in groundwater and soil water pollution at ground level. Identification of pollution that occurs below the soil surface (groundwater contamination) is more difficult to detect, so modeling is needed to find out how the rate of groundwater pollution rate. Modeling is done by using water sampling method at dug well at a location adjacent to the septic tank. Sampling ground water and infiltration modeling are done by using Geostudio SEEP/W software. The research area is in Margahayu village, Bandung regency. The results of laboratory analysis and physical observation in the field show that the Margahayu region has ammonium (NH₄-N) content which is above the standard quality threshold. This condition is reinforced by modeling simulation results that there has been domestic sewage from septic tanks to dug wells. Pollution has reached groundwater level with depth ranged between 4-5 meters. The distance of wells adjacent to the septic tanks affects the quality of groundwater. In the KB area 17 it is indicated that the contamination in the resident's wells on the 31 days, KB new on the 32-40 day time frame, and KB new 2 on the 24th day. Distance sources of contaminants and soil permeability play an important role in determining the travel time of contaminants.

Keywords: Seepage, Domestic sewage, Ammonium, Infiltration, Modelling

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ANALYSIS OF CLIMATOLOGICAL THERMAL COMFORT IN DKI JAKARTA USING HEAT INDEX (HUMIDEX)

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Abstract

Interactions between human and environment about the influence of the physical atmosphere's state or weather on human is expressed in comfort level. The complex relationship between health and weather factors with human comfort is defined as biometeorological index. One of the biometeorological indices is heat index called as Humidex. Studies about Humidex in Jakarta were conducted using climate data stations of Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG), namely air temperature, relative humidity and wind speed daily average during 1985 to 2012. The purpose of this study was to determine the level of thermal comfort using heat index Humidex in Jakarta and its climatological trends during 1985 to 2012. Comparative analysis between Humidex and the wind speed and also with the number of vehicles in Jakarta were conducted to determine their impact to the heat index in Jakarta. The results showed that the Humidex monthly average in Jakarta ranged between 36,1 °C and 39,5 °C. Humidex monthly pattern had two peaks with the first peak was on May and the second one was on November, while the lowest value was recorded on August and January. Humidex in Jakarta tended to increase between 0.05 °C and 0.08 °C with its coefficient of determination (R) was between 0.36 and 0.71. The effect of wind speed to Humidex was lowering the value of Humidex which increased the thermal comfort. Meanwhile, the number of vehicles showed a tendency to grow exponentially, which affected the further decline in thermal comfort level in Jakarta.

Keywords: Heat index, Humidex, Thermal comfort, Jakarta

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THE EFFECT OF CHARGING CONDITION FOR CONDUCTED EMISSION VALUE OF INFORMATION TECHNOLOGY EQUIPMENT

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Abstract

Currently, IT devices, especially mobile phone and notebook, have become a staple for humans. These devices can't be separated from human activities. Mobile phone or notebook using those are too often can lead people to conduct any charging process when that device is being used. In general, there are three conditions for any devices when the charging process is being performed, such as: off, standby, and normal use (music on). This research objective is to compare the result on conducted emission testing when mobile phone and notebook at the plugging charge for the conditions: off, stand by, and normal use (music on). Testing method refers to CISPR 22 Standards at Clause Mains Terminal Disturbance Voltage. Testing result for mobile phone and notebook show that all of testing sample perform conducted emission value with quasi peak value meet the requirement of CISPR 22. The amount of 80% testing sample, perform the highest quasipeak margin value when the off condition of devices.

Keywords: Mobile phone, Notebook, Standby, Conducted emission, Quasipeak

