LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : PROSIDING

Judul Karya Ilmiah (Artikel)	:	The development of permeable pavement from demolished construction waste		
Jumlah Penulis	:	5 orang (D Ulfiana, Suripin, **D A Wulandari**, N N Hudaifah, and N H Salsabila)		
Status Pengusul	:	penulis ke-3		
Identitas Prosiding	:	a. Judul Prosiding	:	IOP Conference Series: Earth and Environmental Science, The 10th Engineering International Conference, Vol 969
		b. ISBN/ ISSN	:	1755-1315 (Online) ; 1755-1307 (Print)
		c. Tahun Terbit / Tempat Pelaksanaan	:	Semarang, 23 September 2021
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		e. Alamat Repository PT / Web Prosiding	:	https://iopscience.iop.org/article/10.1088/1755-1315/969/1/012082/meta
		f. Terindex	:	SCOPUS (From 2010 to Present)

Kategori Publikasi Artikel (beri ✓pada kategori yang tepat)	:	√	Prosiding Forum Ilmiah Internasional
			Prosiding Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Reviewer		Nilai Rata-rata /Nilai Akhir yang diperoleh
	Reviewer I	Reviewer II	
a. Kelengkapan unsur isi artikel (10%)	2,00	3,00	2,50
b. Ruang lingkup dan kedalaman pembahasan (30%)	8,00	7,50	7,75
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	9,00	7,00	8,00
d. Kelengkapan unsur dan kualitas penerbit (30%)	8,00	7,00	7,50
Total (100%)	**27,00**	**24,50**	**25,75**
Nilai pengusul = 40%/4 x 25,75 = 2,575	**2,70**	**2,45**	**2,575**

Reviewer I

Prof. Dr. Ir. Sriyana M.S.
NIP. 196006021986021001
Unit kerja : Departemen Teknik Sipil FT UNDIP

Reviewer II

Prof. Dr. Ir. Sri Sangkawati , MS.
NIP. 195409301980032001
Unit kerja : Departemen Teknik Sipil FT UNDIP

LEMBAR
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		f. Terindex	:	SCOPUS (From 2010 to Present)

Kategori Publikasi Artikel (beri ✓pada kategori yang tepat) : [√] Prosiding Forum Ilmiah Internasional; [ ] Prosiding Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akhir Yang Diperoleh
	Internasional [30]	Nasional [ ]	
a. Kelengkapan unsur isi artikel (10%)	3		2
b. Ruang lingkup dan kedalaman pembahasan (30%)	9		8
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	9		9
d. Kelengkapan unsur dan kualitas terbitan/artikel (30%)	9		8
Total (100%)	**30.00**		**27**
Nilai Pengusul = 40%/4 x 27 = 2.7			

Catatan Penilaian artikel oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi artikel :**
   Unsur-unsur isi artikel dalam jurnal tersebut sudah sesuai dan telah dipersiapkan dengan baik dan lengkap. Unsur-unsur tersebut terdiri dari Judul, abstrak, pendahuluan, bahan dan metode, hasil dan pembahasan, kesimpulan, daftar pustaka, dan ucapan terima kasih dimana pengusul sebagai penulis ketiga.
2. **Ruang lingkup dan kedalaman pembahasan:**
   Ruang lingkup dalam artikel ini bertujuan untuk mengembangkan paving block yang berwawasan lingkungan yang menggunakan bahan bangunan limbah pembongkaran sebagai pengganti batu pecah sebagai agregat kasar. Hasil desain menunjukkan bahwa Paving block ini memiliki laju infiltrasi sebesar 858 mm/jam, lebih tinggi dari hujan rencana umum dan kuat tekan sebesar 11,68 MPa
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Ruang lingkup kajian dideskripsikan dengan lengkap berdasarkan data dan informasi terbaru. Daftar pustaka yang digunakan sebanyak 14 pustaka terbitan 10 tahun terakhir dari 16 pustaka. Secara umum kemutakhiran data dan metodologi yang digunakan relevan dan sesuai dengan prosedur penelitian.
4. **Kelengkapan unsur dan kualitas terbitan:**
   Artikel ini termuat dalam IOP Conference Series: Earth and Environmental Science, The 10th Engineering International Conference, Vol 969, yang diterbitkan oleh IOP Publishing Ltd yang terindeks Scopus, serta dapat dapat diakses secara online. Hasil uji indikasi plagiasi dengan similarity index turnitin yaitu 4 % (karya original).

Semarang, Maret 2022
Reviewer 1

Prof. Dr. Ir. Sriyana M.S.
NIP. 196006021986021001
Unit Kerja : Departemen Teknik Sipil FT UNDIP

LEMBAR
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Kategori Publikasi Artikel (beri ✓pada kategori yang tepat) : [√] Prosiding Forum Ilmiah Internasional; [ ] Prosiding Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akhir Yang Diperoleh
	Internasional [ ]	Nasional [30]	
a. Kelengkapan unsur isi artikel (10%)		3	3
b. Ruang lingkup dan kedalaman pembahasan (30%)		9	7,5
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)		9	7
d. Kelengkapan unsur dan kualitas terbitan/artikel (30%)		9	7
Total (100%)		**30.00**	**24,5**
Nilai Pengusul = 40%/4 x 24,5 = 2,45			

Catatan Penilaian artikel oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi artikel :**
   Unsur artikel dalam jurnal lengkap terdiri dari Title, Abstract, Introduction, Material and Methods, Result and Discussion, Conclusion, Reference. Judul sesuai dengan isi artikel. Sebagai penulis anggota.
2. **Ruang lingkup dan kedalaman pembahasan:**
   Lingkup studi adalah uji permeabilitas *paving block*. Paving dibuat dengan limbah bangunan sebagai pengganti agregat yang terdiri dari agregat daur ulang limbah beton, limbah dinding dan limbah keramik /lantai. Hasil uji model ditampilkan dalam gambar cukup jelas, namun tidak ada pembahasan yang berarti.
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Rujukan yang digunakan 16 pustaka, dengan rujukan primer penerbitan lima tahun terakhir sekitar 30%. Metode yang digunakan adalah uji fisik di laboratorium dengan deskripsi operasional pemodelan kurang detail.
4. **Kelengkapan unsur dan kualitas terbitan:**
   Artikel diterbitkan dalam prosiding IOP Conference Series. Lay out artikel dalam terbitan baik, namun penulisan pustaka tidak jelas. Turniti similarity index 4%.

Semarang, 13 April 2022
Reviewer 2

13 April 2022

Prof. Dr. Ir. Sri Sangkawati , MS.
NIP. 195409301980032001
Unit Kerja : Departemen Teknik Sipil FT UNDIP

CERTIFICATE OF PARTICIPATION

Awarded to

DESYTA ULFIANA

As

Presenter

Paper Title

THE DEVELOPMENT OF PERMEABLE PAVEMENT FROM DEMOLISHED CONSTRUCTION WASTE

The 10th Engineering International Conference 2021

Semarang, Indonesia, September 23rd 2021

Dean of Engineering Faculty
Universitas Negeri Semarang

Dr. Nur Qudus, M.T., IPM.

The 10th EIC Chairman

Dr. Prima Astuti Handayani, S. T., M. T.

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The development of permeable pavement from demolished construction waste

Ulfiana D. , Suripin, Wulandari D.A., Hudaifah N.N., Salsabila N.H.

Save all to author list

[a] Civil Engineering Department, Engineering Faculty, Diponegoro University, Semarang, Indonesia

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Abstract

In Indonesia, paving blocks are one of the most extensively used building materials. Paving blocks are ideal for making roads, parks, and parking lots because they are easy to install, durable, and weather-resistant. The high demand for paving blocks contributes to the increasing demand for aggregate as the main material for paving blocks. This has an indirect impact on the environment. On the other hand, building demolition waste is increasing. The majority of these building materials are non-biodegradable, such as concrete, plaster, brick walls, and tiles, which could harm the environment. Therefore, this study aims to see the possibility of using demolished concrete, brick walls, and tiles as a substitute for the aggregate in the production of permeable paving blocks. Each substitute material is then sampled and evaluated with compressive strength and infiltration rate to find the most optimum permeable paving block design. Based on the analysis, permeable paving blocks that use concrete as a substitute for coarse aggregate have better permeability and compressive strength compared to paving blocks that use brick walls and

THE 10TH ENGINEERING INTERNATIONAL CONFERENCE

Exploring The Innovation of Green-advanced Research in Applied Sciences, Engineering, and Technologies

CONFERENCE E-BOOKLET

Faculty of Engineering
Universitas Negeri Semarang
2021

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WELCOMING SPEECH

Dear colleagues,

Praises all to Allah for His blessing and mercy that allows us to be here today, 23rd September 2021 attending the Engineering International Conference (EIC) 2021. On behalf of committee, I am delighted to welcome all the participants, distinguished delegates, the experts and academics, from around the world to the 10th EIC this year.

The 10th EIC 2021 organized by Faculty of Engineering Universitas Negeri Semarang (UNNES) is conducted to support conservation and international reputation vision. Similar with our previous conference of EIC 2020, EIC 2021 will be held online via webinar due to the impacts of the Coronavirus Disease (COVID-19) around the world. 110 participants from Qatar, Malaysia, Taiwan, Thailand, and Indonesia are joined in EIC 2021.

As an annual conference in engineering, EIC provides a highly competitive forum for informing and reporting the latest developments of concept and application of green technology. The parallel sessions of the conference can be the place for presenters from the engineering areas to share their research results, exchange new ideas, information, and application related to the theory, design, development, implementation, testing or evaluation in the areas of green technology. The concepts of green technologies, can facilitate the goals of keeping the environment intact and improving it for civilization to survive.

This conference focuses on the goals of green technologies, which are becoming increasingly important for ensuring sustainability, provides a different perspective of green technology in the sectors of energy, materials, production, IT and control, building and construction, as well as waste management and transportation. This conference is expected to bridge the gap between the scientific community and policymakers. The accepted and presented paper after peer reviewed will be published in IOP Conference Series: Earth and Environmental Science (Scopus indexed), Journal of Advanced Research in Fluid Mechanics and Thermal Sciences (Scopus indexed), ASEAN Journal of Chemical Engineering (Scopus indexed), Jurnal Bahan Alam Terbarukan (SINTA 2 indexed), Jurnal Teknik Elektro (SINTA 2 indexed), and ISSN International Conference Proceeding.

I would like to thank to the dean and vice dean of faculty of engineering, the keynote speakers, reviewers, and organizing committee for their hard work.

I also would like to express our gratitude to all publishers, our partners from Faculty of Engineering, Mahasarakham University, sponsors and individuals who have contributed to the events and success of this conference. Finally, welcome to EIC e-conference 2021 and we wish you a fruitful conference.

Warm regards,

Dr. Prima Astuti Handayani, S.T., M.T.

Chair of EIC 2021

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CONFERENCE SCHEDULE

TIME*	SCHEDULE
08.00 – 08.25	Opening
08.25 – 08.35	Opening Speech by EIC 2021 Chairman **Dr. Prima Astuti Handayani**
08.35 – 08.45	Speech and opening by UNNES Rector **Prof. Dr. Fathur Rokhman, M.Hum.**
08.45 – 09.00	Photo session and announcement.
09.00 – 09.30	**KEYNOTE SPEECH SESSION 1** **Moderator:** Muhammad Faizal Ardhiansyah Arifin, S.T., M.T., Ph.D. **Keynote 1:** **Assoc Prof. ENOMOTO Hiroshi** Faculty of Mechanical Engineering, Institute of Science and Engineering, Kanazawa University
09.30 – 10.00	**Keynote 2:** **Prof. Shu-Shun Liu, Ph.D.** National Yunlin University of Science and Technology
10.00 – 10.30	Question and answer session for keynote speech session 1
10.30 – 11.00	**KEYNOTE SPEECH SESSION 2** **Moderator:** Dr. Widi Astuti, S.T., M.T. **Keynote 1:** **Dr. Junaidah Jai** School of Chemical Engineering, College of Engineering, Universiti Tekologi MARA
11.00 – 11.30	**Keynote 2:** **Prof. Dr. Wara Dyah Pita Rengga, S.T., M.T.** Department of Chemical Engineering, Faculty of Engineering, Universitas Negeri Semarang
11.30 – 12.00	Question and answer session for keynote speech session 2
12.00 – 13.00	Break
13.00 – 16.00	Parallel Session
16.00 – 16.30	Closing and announcement

Note: * Western Indonesian Time (WIB), UTC +7 (Jakarta Time)

Time	ID	Title
14.15 - 14.30	EIC21E019	**STUDY OF THE APPLICATION OF THE GREEN CONSTRUCTION CONCEPT ON THE INTEGRATED COLLEGE BUILDING PROJECT OF TEUKU UMAR UNIVERSITY** DIAN FEBRIANTI, SAMSUNAN, and EDI MAWARDI
14.30 - 14.45	EIC21E020	**THE DEVELOPMENT OF PERMEABLE PAVEMENT FROM DEMOLISHED CONSTRUCTION WASTE** DESYTA ULFIANA, SURIPIN, DYAH ARI WULANDARI, NADYA NURUL HUDAIFAH, and NADIANA HELMA SALSABILA
14.45 - 15.00	EIC21E021	**THE INTERRELATION OF THE COLONIAL LEGACY AS THE HISTORICAL CONTEXT FOR STRUCTURAL TRANSFORMATION IN CENTRAL JAVA AND YOGYAKARTA** ARI RAHADINI
15.00 - 15.15	EIC21E023	**BUILDING DESIGN RECOMMENDATION FOR THERMAL COMFORT IN CITIES ON THE ISLAND OF JAVA, INDONESIA** MOCH FATHONI SETIAWAN
15.15 - 15.30	EIC21E024	**REDESIGN GAJAH MUNGKUR PARK IN SEMARANG CITY AS PUBLIC SPACE AND GREEN OPEN SPACE WITH USING THE CONCEPT "HIDDEN LAYER OF SEMARANG"** DIMAS WICAKSONO, ISNA PRATIWI, and ARDIYAN ADHI WIBOWO
15.30 - 15.45	EIC21E025	**BEHAVIOR ANALYSIS OF BUILDING COLUMN STRUCTURE WITH RETAINING WALL DUE TO EXPLOSION LOAD IN FRONT AND SIDE A CONSTRUCTION** ENDAH KANTI PANGESTUTI and NISA HANIY KAMILAH
15.45 - 16.00	EIC21E026	**TRANSPORTATION MODELLING USING PTV VISSIM FOR ADJACENT JUNCTION IN SAMPANGAN SEMARANG CITY** UNTORO NUGROHO and KHOFIFAH TSURAYYA FALAH
16.00 - 16.15	EIC21F003	**ORGANIC INHIBITORS FROM RICE HUSKS AS CORROSION RATE INHIBITORS AND STRONG PRESS ENCHANCERS ON REINFORCED CONCRETE CONSTRUCTION** AINAYAH NUR FANIZA, DWIKI ADAM PRAYOGA, AYU NINDIA KUSUMAWATI, and UMU AZIZAH
16.15-16.30	EIC21F004	**ENERGY PERFORMANCE IMPROVEMENT IN STEAM SYSTEM USING STEAM SYSTEM OPTIMIZATION-CASE STUDY TEXTILE PLANT, WEST JAVA, INDONESIA** ENDANG WIDAYATI and HERYANTO

KEYNOTE SPEAKERS PROFILE

Hiroshi Enomoto (Ph. D. in Engineering)

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Research center for Sustainable Energy Technology (RSET)
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Formal education

- Ph. D. in Aeronautics and Astronautics, The University of Tokyo, Tokyo/Japan, 1996-1998
- M. A. in Aeronautics and Astronautics, The University of Tokyo, Tokyo/Japan, 1994-1996

Work experience

- Assoc. Professor in Kanazawa University, Ishikawa/Japan, 2001-present
- Assistant Professor in Osaka Prefecture University, Osaka/Japan, 1999-2001
- Research fellowship for Young Scientist, Japan Society for the Promotion of Science, 1997-2001

Place and date of birth
Osaka, January 27th, 1970

Nationality
Japanese

Achievement

- Minister Prize of Economic, Trade and Industry, 2005
- FISITA (International Federation of Automotive Engineering Societies) Award, 2005
- Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, 2007
- Young Researcher Encouragement Award, Combustion Society of Japan, 2007

Dr. Shu-Shun Liu

Dr. Shu-Shun Liu received the B.S. degree in civil engineering from National Taiwan University, Taiwan, the M.S. degree in structural engineering from Stanford University, USA, and the Ph.D. degree in construction management from Purdue University, USA. He is currently an Associate Professor with the Department of Civil and Construction Engineering, National Yunlin University of Science and Technology, Taiwan. He is also the Director of Smart Construction Management Consulting Center at YunTech. Prior to his academic career, Dr. Liu worked in both construction and IT industries, as Construction Engineer at Taiwan Formosa Group, Taiwan, and Senior IT Analyst at Oracle Corp., USA. Since 2014, Dr. Liu served as Advisory Consultant and provided customized construction IT services to several construction firms in Taiwan. His research interests include construction IT technology, project scheduling optimization, optimization applications to construction management. He has published over 70 articles in high quality journals, and conferences. His work published in leading SCI/SSCI journals include Automation in Construction, Journal of Construction Engineering and Management, ASCE, Applied Science, and Sustainability.

Dr. Junaidah Jai

Affiliation : Faculty of Chemical Engineering,
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Recent Research:

1. Diffusion characteristics of essential oil from encapsulated citrus hystrix essential oil.
2. Biopulping of banana stem using papaya enzymatic extract for pulp and paper.
3. Surface Coating Research Group.
4. Encapsulation of turmeric oil as antimicrobial agent for food coating.
5. Turmeric oil incorporated edible film for food packaging.
6. Molecular interactions and antimicrobial activity of edible chitosan-tapioca starch coatings enriched with curcuma longa.

Publication:

Book / Book chapter

1. Junaidah Jai, Fracture behaviour of alumina reinforced metal matrix composites: Different volume fraction of alumina reinforcement metal matrix composites, VDM Verlag Dr. Müller, German, (2009). ISBN-10: 3836497085 ISBN-13: 978-3836497084
2. Junaidah Jai, Palm oil as Corrosion Inhibitor for Aluminium Car Radiator-Chapter 17, Intech, Croatia, (2014). ISBN: 978-953-51-1223-5

Journal

1. Aqila Zulaikha Nazreen, Junaidah Jai, Sherif Abdulbari Ali, Norasmah Mohamed Manshor, Moisture Adsorption Isotherm Model for Edible Food Film Packaging – A Review, Scientific Research Journal, 17, 2(2020), 221-245.
2. Siti Fatma Abd Karim, Junaidah Jai, Ku Halim Ku Hamid, Abdul Wafi Abdul Jalil, Characteristics and Mechanical Properties Changes Due to Incorporation of Aloe Vera in Polyethylene-Based Film, Scientific Research Journal, 17, 2(2020), 61-80.
3. Siti Fatma Abd Karim, Junaidah Jai, Ku Halim Ku Hamid, Abdul Wafi Abd Jalil, Effect of crude palm oil, Aloe vera, glycerol, and starch on characteristics and mechanical properties of polyethylene film, Malaysian Journal of Chemical Engineering & Technology 3 (1) (2020) 16–24.
4. Nurul Asyikin Md Zaki, Junaidah Jai, Plant-based pigments: Challenges and future perspectives for natural food colourants, Malaysian Journal of Chemical Engineering & Technology 3 (1) (2020) 44–49.

Prof. Dr. Wara Dyah Pita Rengga, S.T., M.T.

Prof. Dr. Wara Dyah Pita Rengga, S.T., M.T., is a lecturer at the State University of Semarang (UNNES). She holds a Doctor's and Master's degree in Chemical Engineering. from the University of Indonesia. Previously worked as a process supervisor in a tire factory. The field involved in research and service is biomaterials. She has published six books, 24 articles in the Scopus journal. She has held conferences in France, Japan, Spain, England, Vietnam. She has been a moderator of international conferences in Japan. She has done guest lectures at universities in Malaysia and Thailand. She has two national patents, one trademark, and two industrial designs. He was the head of the Department of Chemical Engineering, Faculty of Engineering, UNNES. Current position as a group leader at the Quality Guarantor for Research and Public Service of UNNES.

Extractive Distillation of Ethanol/Water with 1-Butyl-3-Methylimidazolium Bromide Ionic Liquid as a Separating Agent: Process Simulation

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Abstract. The purification of ethanol has become a recent great interest because ethanol can be used as renewable energy, solvents in many industries, and for medicinal purposes. The separation of ethanol from water is challenging because the azeotropic point has appeared in this binary mixture. The extractive distillation technology is one of the most interesting methods to separate ethanol from water due to the competitiveness of its energy consumption and capital investment costs. Ionic liquid such as 1-butyl-3-methylimidazolium bromide [BMIM] [Br], which is categorized as green solvent, produces a significant salting-out effect in the ethanol-water system. This makes ionic liquid become a promising solvent in ethanol-water separation. In this study, the extractive distillation of ethanol-water system with 1-butyl-3-methylimidazolium bromide as a solvent was simulated. The simulation and sensitivity analysis were performed on Aspen Plus Process Simulator to obtain the optimum configuration. The NRTL thermodynamic model was used in this study. The effects of the number of stages (NS), binary feed stage (BFS), entrainer feed stage (EFS), and reflux ratio (RR) to the ethanol concentration with minimum energy requirements were studied. The most optimum configuration to produce a high concentration of ethanol with less energy are NS 28, BFS 22, EFS 4, and RR 1.5.

CFD Analysis of Damping Characteristics of a Hydraulic Damper through Throttling Velocity Variation

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Abstract. Shock absorbers or hydraulic dampers are a power dissipating device and fluid flow is governed through predefined passages. This fluid flow passages are responsible for variation in the damping or hydraulic characteristics in terms of damping force with respect to velocity. The piston inside the damper has a various orifice or piston valves that cause different flow losses. A Computational Fluid Dynamics (CFD) method is used to validate a previous study and investigate a modified model. The previous study has shown the numerical and experimental damping characteristics of a rear side two-wheeler automobile mono tube damper for different number of orifices in the piston which are two, six and ten orifices opening. CFD analysis is carried out for different number of orifices in the piston to validate the damping characteristics of a shock absorber. The throttling velocities are changing. A total of 48 simulations are done, simulations are compared with the previous numerical and experimental results and have shown agreement. A modified model is proposed and it is damping characteristics are studied.

The Effect of Hydroxyapatite Concentration on the Mechanical Properties and Degradation Rate of Biocomposite for Biomedical Applications

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Abstract. Biocomposite is a material that have potential to heal injured bones and teeth due to their biocompatible, non-toxic, non-inflammation, and bioactive properties which can prevent infections that occurs frequently during surgical processes. Biocomposites made of PLA, PCL, and HA from bovine bone as a substitute for metal materials in medical applications have been widely studied. However, there are limited studies on the biocomposites made of PLA, PCL, and HA from green mussel shells. Therefore, this study aims to produce biocomposites from Polylactic Acid (PLA), Polycaprolactone (PCL), and Hydroxyapatite (HA) from green mussel shells and to determine the effect of HA concentration on the mechanical properties and degradation rate of the resulting biocomposite. 80 ml of chloroform was used to dissolve 16 grams of a PLA/PCL mixture with a composition of 80% and 20%. After 30 minutes, the solution was agitated for 30 minutes with a magnetic stirrer at 50^{o}C and 300 rpm. After obtaining a homogenous solution, hydroxyapatite was added in percentages of 5%, 10%, 15%, and 20% of the total weight of the PLA/PCL mixture. The resulting mixture is poured into a glass mold in accordance with ASTM D790. Three-point bending, density, and biodegradable test were performed to investigate the effect of HA content on the mechanical properties and degradation rate of the biocomposite. The results of this study indicate that the mechanical properties of the biocomposite improved with the HA concentration increases. However, the more HA content used, the faster the biocomposite degrades.

Design and Development of Temporary Immersion Bioreactor System Controlled by Microcontroller

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Abstract. This research aims to develop, design and construct a temporary immersion bioreactor (TIB) controlled by microcontroller. The designed TIB system can control the time for plant feeding and the carbon dioxide concentration via application which makes it convenient to the user for defining the operating times of the system. The constructed TIB consists of 2 sets of the plant tissue culture containers. The TIB system can define the feeding time up to 10 time periods per day and also can set the time to control carbon dioxide concentration up to 4 time periods per day. The system starts to feed the plants at the set times and stop working when reaching the set time periods for plant feeding. For the carbon dioxide concentration control, the system operates during the defined time periods to measure and adjust the carbon dioxide concentration following the set values. The test results of the feeding time control illustrated that the constructed TIB system could set the feeding times conveniently and quickly. Moreover, the system could properly work following the set time periods. For the test results of the carbon dioxide concentration control, it was found that the TIB could control the carbon dioxide concentration in the containers during the set operating time periods. It took about 7, 28, 30, 36 and 21 minutes after the system started working to adjust the carbon dioxide concentration in order to be at the set levels of <750, 1,500, 2,000, 2,500 and 3,000 ppm, respectively. The carbon dioxide concentration control system could properly work with error less than 10%.