FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q1
IF: 6.348

Congratulations

Author: **AP. Ts. Dr. Ismail Saad**

ACS APPLIED ENERGY MATERIALS

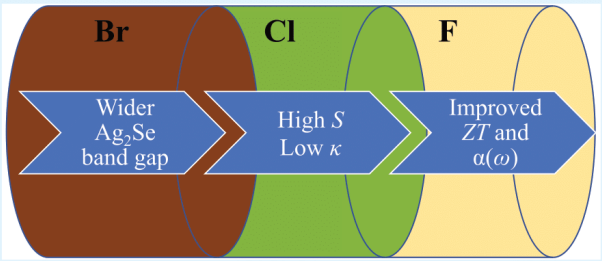
www.acsaem.org Article

Improved Thermoelectric–Photovoltaic Performance of Ag_2Se Originating from a Halogenation-Induced Wider Band Gap and Low Crystal Symmetry

Yee Hui Robin Chang,* Junke Jiang, Keat Hoe Yeoh, Heng Yen Khong, Mohd Muzamir Mahat, Soo See Chai, Ismail Saad, and Moi Hua Tuh

Cite This: https://doi.org/10.1021/acsaem.2c00438 Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information



ABSTRACT: Ag_2Se has drawn widespread attention in wearable self-powered technologies because of its ductile nature, chemical stability, and low toxicity. However, its stable orthorhombic bulk phase is a narrow band gap material with compromised Seebeck coefficient. In this work, motivated by the discovery of stretchable Ag_2Se and various studies demonstrating the positive role of halogenation toward semiconductor performance, synergistical enhancement of its Seebeck coefficient and quality factor integrating the weighted mobility and lattice thermal conductivity have been achieved by halogenation. Prediction of energy landscape within Ag_2Se–X_2 (X = F, Cl, and Br) was calculated through global evolutionary algorithm in combination with first-principles approach. Three low-lying energy moieties, Ag_2SeBr_4, Ag_2SeCl_6, and Ag_2SeF_6, and their 2D counterparts with $P1$ symmetry are deformable inorganic semiconductors exhibiting sufficient electronic, thermal, mechanical and lattice stabilities. Ultimately, their combined low-lying dispersive phonon modes resulting from low crystal symmetry and flattened conduction band due to increased band gap drastically improve the Seebeck coefficient, reduce the band energy offset, and maintain the high phonon scattering rate, in turn leading to an ultralow thermal conductivity (<0.50 W m^{-1} K^{-1} at 300 K), enhanced bipolar conduction suppression, and large increase in electronic quality factor, without relinquishing the ductility. As a result, at ~9 × 10^{19} cm^{-3} optimal carrier concentration,

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q1
IF: 6.063

Congratulations

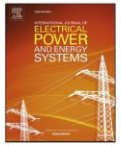
Author: **AP. Dr. Kenneth Teo Tze Kin**

Electrical Power and Energy Systems 142 (2022) 108240

Contents lists available at ScienceDirect

International Journal of Electrical Power and Energy Systems

journal homepage: www.elsevier.com/locate/ijepes



Check for updates

Mid- and long-term strategy based on electric vehicle charging unpredictability and ownership estimation

Hui Hwang Goh [a,*], Lian Zong [a], Dongdong Zhang [a], Hui Liu [a], Wei Dai [a], Chee Shen Lim [b], Tonni Agustiono Kurniawan [c], Kenneth Tze Kin Teo [d], Kai Chen Goh [e]

[a] School of Electrical Engineering, Guangxi University, Nanning 530004, China
[b] University of Southampton Malaysia, Iskandar Puteri 79200, Malaysia
[c] College of Environment and Ecology, Xiamen University, Fujian 361102, China
[d] mscLab, Faculty of Engineering, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia
[e] Department of Technology Management, Faculty of Construction Management and Business, University Tun Hussein Onn Malaysia, Parit Raja, Johor 86400, Malaysia

ARTICLE INFO

Keywords:
Charging load
Electric vehicle
Probabilistic load model
Ownership forecasting model
Monte Carlo simulation

ABSTRACT

Predicting the charging load of electric vehicles (EVs) is critical for the safe and reliable operation of the distribution network. Analyzing an EV's random charging characteristics and the uncertainty associated with its development scale are important to accurate prediction of its charging load. For this reason, we proposed a seminal method for predicting EV charging load based on stochastic uncertainty analysis. This included not only a probabilistic load model for describing the stochastic characteristics of the EV charging, but also an ownership forecasting model for estimating the EV development scale. EVs are classified into four categories based on their intended use: electric buses, electric taxis, private EVs, and official EVs. The corresponding load calculation model was developed by analyzing the charging behavior of various EVs. Simultaneously, the improved grey model method (IGMM) based on the Fourier residual correction is used to accurately forecast EV ownership. Finally, the scientific method of Monte Carlo simulation(MCS) was used to estimate the charging load demand of EVs. This method was used in Wuhan that has a lot of potential for EV production. As compared to the basic grey model method (BGMM), the IGMM outlined in this work can triple the prediction effect. Due to the large-scale charging of EVs, Wuhan's maximum daily total load would rise to 15,532.9 MW on working days and 15,475.5 MW on rest days in 2025. Additionally, the total load curves on working days and rest days will show a new peak load with the value of 14751.3 MW and 14787.2 MW at 14:01, resulting in an increase of 13.56% and 13.83% respectively in the basic daily load stage. As a result, it is necessary for grid operators to build adequate capacity to meet EV charging demands, while developing rational and orderly charging strategies to avoid the emergence of new load peaks.

sector consumes >60% of global oil and emits 13% of global greenhouse gas emissions [3]. In 2016, the transportation sector consumed 28.7% of

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q1
IF: 5.034

Congratulations

Author: **Ts. Dr. Lillian @ Lilia Gungat**

Environmental Science and Pollution Research (2022) 29:10771–10781
https://doi.org/10.1007/s11356-021-16499-2

RESEARCH ARTICLE

Check for updates

Pavement maintenance management framework for flexible roads: a case study of Pakistan

Shabir Hussain Khahro[1,2] · Zubair Ahmed Memon[2] · Nur Izzi Md. Yusoff[1] · Lillian Gungat[3] · Muhamad Razuhanafi Mat Yazid[1]

Received: 30 May 2021 / Accepted: 7 September 2021 / Published online: 16 September 2021

Abstract
Roads play a pivotal role in the overall economic growth of any country. Developed countries allocated sufficient budget to make new roads and to maintain the existing roads. They also have a proper pavement management system (PMS) in practice to manage roads, whereas developing countries suffer from budgetary issues to make new roads and maintain the existing road network. Therefore, this paper explores the awareness of PMS via direct and indirect methods in Pakistan with a proposed framework of the low-cost model and pavement maintenance indicators for developing countries. This paper also performs a scientometric assessment of PMS. A detailed literature review has been carried out for this study, followed by a quantitative study from experienced professionals. The scientometric data is collected from the Scopus database from 1975 to 2020, whereas the data for PMS awareness assessment has been collected using questionnaires from different experts working directly and indirectly in the road management sector. The data has been analyzed using the arithmetic mean because of the nature of the questions and scope of the study. The direct method results show that experts are aware of PMS for a new road, but they have no PMS to rehabilitate roads. The indirect method results show that the authorities are applying various components of PMS, but there is no proper PMS in practice. This paper helps decision-makers to make better decisions and policies for improved road maintenance and rehabilitation. The proposed framework in the study can significantly assist the UN-SDG 9 (Facilitate Sustainable Infrastructure in Developing Countries) and 11 (Affordable and Sustainable Transport System).

Keywords Pavement management system · Defects · Scientometric analysis · Preservation programs

Responsible Editor: Philippe Garrigues

✉ Shabir Hussain Khahro
P99955@ukm.edu.my; shkhahro@gmail.com

Zubair Ahmed Memon
zamemon@psu.edu.sa

Nur Izzi Md. Yusoff

Introduction

Roads form an integral part of the transport infrastructure. Road connectivity helps distribute the product from a remote location to the urban areas where it will be consumed. In return, essential products and facilities can reach the rural areas. Thus, maintaining roads and their better condi-

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q2
IF: 2.300

Congratulations

Author: **Dr. Sheikh Mohd Iqbal Bin S Zainal Abidin**

KSCE Journal of Civil Engineering (2022) 26(1):131-142
DOI 10.1007/s12205-021-1061-2

pISSN 1226-7988, eISSN 1976-3808
www.springer.com/12205

Structural Engineering

The Synergistic Effects of Different Types of Hybridized Synthetic Fibers on Concrete Post-Crack Residual Strength

S. M. Iqbal S. Zainal[a,b], **Farzad Hejazi**[a], **Farah Nora Aznieta Abd. Aziz**[a], **and Mohd Saleh Jaafar**[a]

[a]*Dept. of Civil Engineering, Universiti Putra Malaysia, Seri Kembangan 43400, Malaysia*
[b]*Dept. of Civil Engineering, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia*

ARTICLE HISTORY

Received 1 July 2020
Revised 1st 7 February 2021
Revised 2nd 13 June 2021
Accepted 4 August 2021
Published Online 18 September 2021

KEYWORDS

Average residual strength
Hybrid fiber reinforced concrete
Synthetic fibers
Flexural toughness
Hybridization synergy
ASTM C1399

ABSTRACT

The use of fibers in cement composites has been shown to improve the mechanical properties of concrete through the fiber-bridging effect, which implies the fiber's crack-resisting property. Additionally, the combination of two or more different fibers in the concrete mixture yielded better strength than the individual fibers due to its more versatile applications. Therefore, this study was conducted to investigate the combination of multiple synthetic fibers to improve the concrete residual strength and evaluate the hybridization synergistic effect. Ferro macro-sized fiber (FF) as the primary load-bearing fiber and four different secondary synthetic microfibers comprising Ultra-Net (UN), Super-Net (SN), Econo-Net (EN), and Nylo-Mono (NM) were utilized to develop a total of 16 hybrid fiber reinforced concrete (HyFRC) combinations and the performance were compared against their single-fiber counterpart. The tensile strength, bonding power, physical form, length, and volume fraction of the fibers were measured under the ASTM C1399 test standard in order to calculate the average residual strength (ARS) of concrete in the post-cracking region as well as to assess the synergistic effect of the fiber combination. The results recorded positive fiber synergy for all specimens tested. In addition, the Ferro-Nylo, Ferro-Super, Ferro-Econo, and Ferro-Ultra hybrids improved the ARS compared to the controlled specimens by 20.41, 10.2, 7.48, and 6.12%, respectively.

1. Introduction

Concrete is one of the most common construction materials used in infrastructures due to its economic value, availability, and versatile application. However, concrete is brittle in nature and

synthetic fibers could improve the performance of concrete equal to that of steel fibers and can replace secondary steel reinforcements because of its 3-dimensional (3D) reinforcement (McCraven, 2002). Banthia and Sappakittipakorn (2007) concluded that optimizing the combination of small and large diameter steel

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q2
IF: 1.949

Congratulations

Author: **Dr. Mohd Kamal Mohd Shah**

Augmented reality – an important aspect of Industry 4.0

Aatish Sharma, Raied Mehtab and Sanjay Mohan
School of Mechanical Engineering, Shri Mata Vaishno Devi University, Katra, India, and
Mohd Kamal Mohd Shah
Faculty of Engineering, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia

Abstract

Purpose – Augmented reality (AR) integrates the digital world with the real world and thus, provides a real-time experience to the users. With AR, the immediate surroundings become a learning platform for the users. The perception of the products has been enhanced many times with AR; thus, enriching user experience and responsiveness. The purpose of this paper is to bring forth the basics of AR and provide an overview of the research work carried out by researchers in the implementation of AR in different sectors.

Design/methodology/approach – This paper summarizes the usefulness of AR in different industries. The authors have identified the peer-reviewed research publications from Web of Science, Scopus, Google Scholar, etc. The selection of literature has been made based upon the significance of AR in recent times. The industries/sectors where AR has been implemented successfully have been considered for this paper. The paper has been divided into various sections and subsections to bring more clarity to the readers.

Findings – This paper presents a brief and a precise information on Industry 4.0 and AR. The basic working of AR system and its implications have also been discussed. The preference of AR over virtual reality (VR) has also been deliberated in this paper. The authors have presented the usefulness of AR in different sectors such as smart factories, ship yard building, online shopping, surgery and education. This paper discusses the AR-ready procedures being followed in these sectors.

Originality/value – AR has been an add-on to VR systems. The processes in industries have become very handy and informative with AR. Because the application of AR in different sectors has not been discussed in a single paper; thus, this work presents a systematic literature review on the applications of AR in different sectors/industries.

Keywords Smart factory, Shipyard, Augmented reality, Online shopping, Surgery, Education, Industry 4.0

Paper type Literature review

1. Introduction

There always has been a demand from manufacturers to increase productivity and efficiency. They have been finding the ways and means to increase throughput, decrease the price of supplying quality products, decrease downtime, etc. With the passage of time, researchers/industrial engineers have developed newer systems to enhance productivity, and hence, industrial

(Inkulu *et al.*, 2021; Lasi *et al.*, 2014; Lee *et al.*, 2014). Industry 4.0 (I 4.0) also stresses upon the novel system of level of administration and control over the value chain of the life cycle of the products. It is focused more on the customized manufacturing of products based upon the individual requirements (Vaidya *et al.*, 2018). It involves smart manufacturing, Internet of Things (IoT), cloud-based manufacturing, etc. Figure 1 summarises the evolution of

FKJ Publication

May 2022

Biointerface Research in Applied Chemistry
Open-Access Journal (ISSN: 2069-5837)

Article
Volume 13, Issue 2, 2023, 193
https://doi.org/10.33263/BRIAC132.193

Synthesis and Characterization UV-Curable Waterborne Polyurethane Acrylate/Al_2O_3 Nanocomposite Coatings Derived from Jatropha Oil Polyol

Suhaini Mamat [1,2,*], Luqman Chuah Abdullah [1,3,*], Min Min Aung [3,5], Suraya Abdul Rashid [1,4], Mek Zah Salleh [6], Sariah Saalah [7], Emiliana Rose Jusoh [3], Marwah Rayung [3]

1 Department of Chemical and Environmental Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia; suhainim@micet.unikl.edu.my;chuah@upm.edu.my (L.C.A.);
2 School of Environment and Polymer Engineering Technology, Malaysian Institute of Chemical and Bioengineering Technology (MICET), Universiti Kuala Lumpur, Taboh Naning, Alor Gajah 78000, Melaka, Malaysia
3 Higher Institution Centre of Excellence Wood and Tropical Fibre (HICoE), Institute of Tropical Forestry and Forest Products, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia; minmin_aung@upm.edu.my (M.M.A.); tintahikmah@gmail.com (E.R.J.); marwahrayung@yahoo.com (M.R.);
4 Institute of Nanoscience and Nanotechnology, University Putra Malaysia, Serdang 43000, Selangor, Malaysia suraya_ar@upm.edu.my (S.A.R.);
5 Department of Chemistry, Faculty of Science and Technology, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia
6 Radiation Processing Technology Division, Malaysian Nuclear Agency, Kajang 43000, Selangor, Malaysia; mekzah@nuclearmalaysia.gov.my (M.Z.S.);
7 Chemical Engineering Programme, Faculty of Engineering, Universiti Malaysia Sabah, Jalan UMS, Kota Kinabalu 88400, Sabah, Malaysia; s_sariah@ums.edu.my (S.S.);
* Correspondence: suhainim@unikl.edu.my (S.M.); chuah@upm.edu.my (L.C.A.);

Scopus Author ID 57193830517
Received: 28.01.2022; Accepted: 12.03.2022; Published: 3.04.2022

Abstract: A new UV-curable waterborne polyurethane acrylate/alumina (UV-WPUA/Al_2O_3) coatings were successfully developed. The waterborne polyurethane acrylate (WPUA) dispersion was synthesized by reacting jatropha oil polyol (JOL) with isophorone diisocyanate (IPDI), 2,2-dimethylol propionic acid (DMPA), and 2-hydroxyethyl methacrylate (HEMA) via in-situ and anionic self-emulsifying methods. The WPUA/Al_2O_3 dispersion was formulated by various sonicating concentrations of alumina nanoparticles (0.3, 0.6, 0.9, and 1.2 wt%) into WPUA dispersion. The UV-WPUA/Al_2O_3 coatings were obtained with 75 wt% oligomers, 25 wt% monomer trimethylolpropane triacrylate (TMPTA), and 3 wt% of a commercial photoinitiator (benzophenol) for UV-curing were

Q3
IF: 2.226

Congratulations

Author: **Dr. Sariah Binti Saalah**

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q3
IF: 1.455

Congratulations

Author: **AP. Dr. Jidon @ Adrian Bin Janaun**

Co-Author: **Dr. Tham Heng Jin,**
AP. Ts. Dr. Nancy Julius Siambun

Materials Today: Proceedings 57 (2022) 1338–1344

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Performance analysis of a solar heat collector through experimental and CFD investigation

A.S.T. Tan [a], J. Janaun [a,c,*], H.J. Tham [a], N.J. Siambun [a], A. Abdullah [b,*]

[a] Industrial Dryer and Palm Oil Recovery Research Group, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia
[b] Chancellery Office, Universiti Malaysia Kelantan, 16300 Bachok, Kelantan, Malaysia
[c] Small Islands Research Centre, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia

ARTICLE INFO

Article history:
Received 5 July 2021
Received in revised form 26 January 2022
Accepted 8 February 2022
Available online 24 February 2022

Keywords:
Solar heat collector
Performance evaluation
Numerical simulation
Experimental validation

ABSTRACT

In order to attain maximum efficiency in a solar drying system, continuous effort is made to the key component of solar dryer – solar heat collector (SHC). This research aimed to evaluate the thermal performance of SHC with different flow configuration in the air passage, namely single-pass (S-SHC) and multiple-pass (M-SHC), under natural convection (average air velocity = 0.2 m/s). In order to study the flow and heat transfer characteristics across the SHC, performance analysis was carried out by Computational Fluid Dynamic (CFD) simulation and later validated by experimental results. From the simulation model, the collector outlet temperature and efficiency of M-SHC at maximum solar radiation were 67.4 °C and 10.04%, respectively with percentage error of 8.6% and 17.79% to the experimental results. The presence of recirculation region indicated extended drying air residence time in the M-SHC, resulting in high temperature growth from 8.8% to 12.1% across the air passage compared to S-SHC. In addition, heat transfer enhancement in M-SHC was achieved by compensating radiation heat loss observed in S-SHC through the modification of airflow configuration. Both experimental and theoretical analysis in this study showed that the proposed enhancement significantly improved the performance of SHC having air passage made from recycled aluminium cans.

Selection and peer-review under responsibility of the scientific committee of the International Symposium of Reaction Engineering, Catalysis & Sustainable Energy.

1. Introduction

plays an important role in ensuring high efficiency, cost effective,

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q3
IF: 1.123

Congratulations

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences 93, Issue 2 (2022) 17-27

SEMARAK ILMU PUBLISHING

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

Journal homepage:
https://semarakilmu.com.my/journals/index.php/fluid_mechanics_thermal_sciences/index
ISSN: 2811-3950

Performance of The Direct Evaporative Cooler (DEC) Operating in A Hot and Humid Region of Sabah Malaysia

Zulkurnain Hassan[1], Mohd Suffian Misaran@Misran[1,*], Nancy Julius Siambun[1]

[1] Faculty of Engineering, Universiti Malaysia Sabah (UMS), Malaysia

ARTICLE INFO

Article history:
Received 11 November 2021
Received in revised form 21 January 2022
Accepted 5 February 2022
Available online 16 March 2022

Keywords:
Direct evaporative cooler; feasibility index; performance; saturation efficiency; cooler capacity

ABSTRACT

In the last decade, energy consumption for air conditioning applications has been dramatically rising because of the growing global population and increasing comfort demand. Consequently, direct evaporative cooling (DEC) technology is emerging as an alternative to vapour compression air conditioners due to its lower environmental impacts, less energy consumption, and lower operating costs. This paper aims to evaluate the efficiency of direct evaporators in hot, humid environments like Malaysia. Inlet and outlet temperatures, saturation efficiency, cooling capability, and feasibility index are all used to evaluate results. The cooling medium was a rectangular honeycomb cooling pad with a length of 34 cm, a width of 25 cm, and a thickness of 3.5 cm. The temperature and humidity during the analysis were between 31 and 35°C and 47.5 and 65.5%, respectively. The results showed that the air output temperature varied between 28.4°C and 31.7°C, while the cooling capacity between 0.29 kW and 0.64 kW as well as the saturation efficiency between 46% to 80% could be achieved. The result also showed a feasibility index between 19 to 24. Due to the high value of the feasibility index, this evaporative cooling does not work well in the territory of Malaysia. A direct evaporative cooler may be made to work in humid places like Malaysia by drying the air before the evaporative process using the desiccant dehumidification concept.

Author: **Dr. Mohd Suffian Bin Misaran @ Misran**

Co-Author: **AP. Ts. Dr. Nancy Julius Siambun**

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Jurnal Teknologi

Full Paper

INVESTIGATION ON THE BARRIERS OF CRUMB RUBBER USAGE FOR ROADS CONSTRUCTION: CASE STUDY AT SABAH

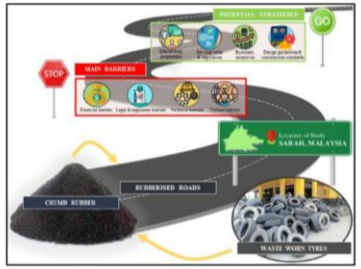
Lillian Gungat[a*], Melbourne Dinola Dagul[a], Elsa Eka Putri[b]

[a]Civil Engineering Programme, Faculty of Engineering, Universiti Malaysia Sabah, Malaysia
[b]Department of Civil Engineering, Faculty of Engineering, University of Andalas, Padang, Indonesia

*Corresponding author
lillian@ums.edu.my

Article history
Received
22 June 2021
Received in revised form
26 September 2021
Accepted
7 November 2021
Published Online
21 February 2022

Graphical abstract



Abstract

The usage of crumb rubber in road construction has been widely acknowledged and extensively implemented globally and even locally in Malaysia due to the substantial benefits and versatility of this material contribution in road works. Even though the used of crumb rubber material in road works has been reported since the 1950s, in Malaysia, the implementation of rubberised roads technology concept have been limited and emphasised only in Peninsular Malaysia. In contrast, there have been no recorded trials or construction inroads applying this technology in Sabah. Therefore, there is a necessity to investigate the awareness, advantages, barriers, strategies, and personal opinion regarding crumb rubber usage in the road's construction of Sabah. Questionnaire surveys and structured interviews from stakeholders of the construction industries within Sabah were conducted. The quantitative data collected was tested by descriptive statistics frequencies analysis respective to each section. Further assessment on Cronbach's Alpha test, mean value comparison, relative important index, chi-square test and regression analysis were performed to interested sections. Findings showed that the main advantages and barrier were environmentally friendly factor and financial barriers. Hence respondents propose that guidelines and construction standards as a guidance for the local road agency to be available.

Keywords: Crumb rubber, roads construction, barriers, sustainable, quantitative

Abstrak

Penggunaan getah remah dalam pembinaan jalan raya telah diakui secara

Q3
IF: 0.862

Congratulations

Author: **Ts. Dr. Lillian @ Lilia Gungat**

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

Q4
IF: 0.471

Congratulations

Author: **Ir. Dr. Ahmad Mukifza Bin Harun**

EFFECTS OF TEMPERATURE AND CONCENTRATION OF SIMULATED BODY FLUID ON BONE APATITE FORMATION USING ELECTROSPUN POLY(E-CAPROLACTONE) FIBRE SUBSTRATE

Nur Aqilah Ibrahim[1], Nor Dalila Nor Affandi[1*], Ahmad Mukifza Harun[2], Mohammad Khursheed Alam[3,4] and Noor Najmi Bonnia[1,5]

[1]Textile Research Group, Faculty of Applied Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia.
[2]Engineering Faculty, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
[3]College of Dentistry, Jouf University, 72721 Sakaka, Saudi Arabia.
[4]Department of Dental Research Cell, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, 600077 Chennai, India.
[5]Materials Science and Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.

*dalila@uitm.edu.my

Abstract. A versatile synthetic matrix material for bone regeneration using electrospun fibres was introduced in this study. In this work, the electrospinning parameters were controlled to produce favourable porous fibre substrate that can aid in forming calcium phosphate during an in-vitro biomineralisation process. The fibre substrate underwent two concentrations of simulated body fluid (SBF) to incubate the electrospun poly(ε-caprolactone) (PCL) fibre substrate at different temperatures (37 °C and 25 °C) for 7, 14, and 21 incubation days. The resultant substrate exhibited a large pore diameter with approximately 10 µm and uniform thick layer at about 0.36 ± 0.04 mm. From the SEM analysis, a hexagonal apatite structure was formed. An increase in bone apatite was observed when the SBF concentration increased from 1.0 x to 3.0 x. The EDX analysis showed that by increasing the incubation days to 21, the resultant crystal apatite decreased at body temperature of 37 °C. At room temperature of 25 °C, more crystal apatite was observed under the SEM as the incubation days increased. The current study suggested that the bioactivity of electrospun PCL substrate can be done at body temperatures as well as room temperature.

FKJ Publication

May 2022

UMS UNIVERSITI MALAYSIA SABAH

FKJ engineUMS

https://doi.org/10.48048/tis.2022.3464

An Overview: Relationship of Geological Condition and Rainfall with Landslide Events at East Malaysia

Mohammad Haziq Rosly, Habib Musa Mohamad*, Nurmin Bolong and Noor Sheena Herayani Harith

Faculty of Engineering, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia

(*Corresponding author's e-mail: habibmusa@ums.edu.my)

Received: 13 November 2020, Revised: 1 June 2021, Accepted: 11 June 2021

Abstract

Tropical country like Malaysia is rich with residual soil and nurtured with high rainfall amount on average 2,550 mm per year. From 2009 until 2018, there are many landslide events reported in the news at Ranau, Sabah and Canada Hill Miri, Sarawak that occurred during rainy season and the landslide recurs within same location over the years. The objective of this study is to determine the relationship of landslide events with geological condition and rainfall at Ranau, Sabah and Canada Hill Miri, Sarawak. Historical landslide data were obtained from local news, previous researchers, and local authorities. Integrated review was conducted to meet the objective. In summary, both areas are prone to landslide due to the high average amount rainfall recorded and the geological properties that are susceptible to landslide occurrence namely shale interbedded with sandstone. Sandstone and shale contact are easily accessible by water weaken the contact surface lead to landslides incidents. Besides, Shale classified as highly plastic soil due to high amount of clay. Clay soil depends on its matric suction to sustain its strength towards sliding. Thus, increasing of pore pressure from rain infiltration reduce the matric suction and eventually reduce the shear strength. Ranau is located at seismically active area compare to Miri and other locations in Sabah crossing Lobou-Lobou fault, Mensaban fault and Mesilou fault. Theoretically, slope instability due to earthquake happened because the cementation of soil may be broken and lead to lesser roughness between soil surfaces resulting in reduction of internal friction angle and cohesion of soil.

Keywords: Rainfall-induced landslide, Earthquake-induced landslide, Unsaturated soil strength

Introduction

Landslide can be described as a variety of processes that resulting in the downward and outward movement of slope-forming materials including rock, soil, artificial fill or combination of these materials either by falling, toppling, sliding, spreading or flowing influenced by gravity [1-3]. It is one of the major hazards that lead to hundreds of deaths and loss of property worldwide including Malaysia every year particularly during rainy season that usually occur due to instability of slopes, distressed slopes and unprotected fill or cut slopes [2-8].

Referring to historical data obtained, there were 8 landslide cases recorded at Ranau, Sabah and 8

Congratulations

Author: **Ir. Ts. Dr. Habib Musa Bin Mohamad**

Co-Author: **AP. Ir. Dr. Nurmin Bt. Bolong**

Ts. Dr. Noor Sheena Herayani Binti Harith