THE 15th INTERNATIONAL CONFERENCE on QiR

(Quality in Research)

PROCEEDING

in conjunction with:



6th IEEE International Conference on Advanced Logistics and Transport (ICALT 2017)



International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA)



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PREFACE

WELCOME FROM THE RECTOR OF UNIVERSITAS INDONESIA

It is both a pleasure and honor for me to welcome you all to the 15th International Conference on QiR (Quality in Research) 2017 in Nusa Dua, Bali, Indonesia.

Universitas Indonesia strives to be one of the leading research universities and the most outstanding academic institution in the world. UI is distinctive among research universities in its commitment to the academic invention and research activities through various scientific programs. QiR 2017 is our main academic conference in the field of engineering and technology which has been successfully held for the last two decades. It is our hope that this world class scientific program would showcase our scientists and researchers achievements and provide forums for scientific exchanges in their respective fields.



The theme this year of 'Science, Technology and Innovation for Sustainable World', is very relevant with the fact that the globalization today results in very competitive atmosphere in all aspects. However, this flourishing competition should consider the harmony and balance between human needs and the environment quality for creating favorable sustainable future. Scientists and researchers, hand in hand with industrial experts are creating and developing new sustainable technologies that enable us to make products and services more efficient, design better buildings, produce safer cars, keep people healthier and building smarter cities.

I extend my sincere thanks to the Faculty of Engineering Universitas Indonesia, supporting parties and institutions for their participation and contributions in QiR 2017. I would also thank our colleagues from Universitas Udayana and Politeknik Negeri Bali for their gracious support and hospitality. Additionally, I extend a hearty thank you to the members of the organizing committees for dedicating their valuable time so that each one of us enjoys an exceptional conference program over the next several days. May we have a successful, stimulating, fruitful and rewarding conference.

Prof. Dr. Ir. Muhammad Anis, M.Met. Rector Universitas Indonesia



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PREFACE

WELCOME FROM THE DEAN OF FACULTY OF ENGINEERING UNIVERSITAS INDONESIA

Welcome to the 15th International Conference on QiR (Quality in Research) 2017. The Faculty of Engineering Universitas Indonesia is delighted to host our flagship international academic event this year back in Bali, Indonesia. This two-day, biennial conference is presented together with our co-hosts Universitas Udayana and Politeknik Negeri Bali with the hope that this would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation.



The main theme for this year conference, "Science, Technology and Innovation for Sustainable World" is consistent with the mission of our faculty to be a leading institution with the initiatives that responds to local, national and global societal needs. In that context, the Faculty of Engineering Universitas Indonesia is performing state-of-the arts research and development in engineering and architecture areas which results in technology and innovation which contribute to sustainable development at both national and global level. QiR 2017 provides platforms and forums to disseminate our scientific achievements and exchange information with our counterparts from Indonesia and all over the world. This event will allow for further research and education collaborations between Universitas Indonesia and its partners worldwide.

I would like to express my deepest appreciation to our sponsors, supported parties and various contributors for their never ending supports of this conference. I would also like to convey my gratitude to all of our distinguished speakers for making the time to share their knowledge with us. To our fellow researchers and/or practitioners from Indonesia and overseas, welcome and enjoy your stay in this Nusa Dua, Bali. I would also like to invite all participants in expressing our appreciation to all members of the QiR 2017 organizing committee for their hard work in making this conference success.

Prof. Dr. Ir. Dedi Priadi, DEA Dean Faculty of Engineering Universitas Indonesia IOP Conf. Series: Materials Science and Engineering **316** (2018) 011001 doi:10.1088/1757-899X/316/1/011001





WELCOME FROM THE QIR 2015 ORGANIZING COMMITTEE

On behalf of the organizing committee, it is a great pleasure for us to welcome you to the 15th International Conference on Quality in Research (QiR) 2017 to be held in Bali, Indonesia on July, 24 – 27, 2017. This biennial event is co-organized with the Faculty of Engineering Universitas Udayana and Politeknik Negeri Bali.



PREFACE

The main theme for this year conference is "Science, Technology and Innovation for Sustainable World". Under this theme the conference

focuses on the innovative research and contribution in science and technology toward achieving sustainable world. In line with this theme, it is our utmost pleasure to hold the QiR 2017 in conjunction with the 6th IEEE-International Conference on Advanced Logistics and Transport (ICALT), the 2nd International Symposium on Biomedical Engineering (ISBE 2017), International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA) and the 3rd Biannual Meeting on Bioprocess Engineering.

The QiR 2017 brings together national and international academicians, researchers, executives, government, industrial and business officials, practitioners and leaders to present and discuss a vast range of engineering, architectural designs and community development based on green and smart technology. It is our hope and aim that this conference would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation. Furthermore, QiR 2017 benefits industry sector, since it would create a close contact between and among the audiences. The audiences mostly come from different job and activities: therefore this is a great potential and opportunity to meet each other, creating fruitful discussions and broaden business relationship.

QiR has been growing, since its first event two decades ago, into our flagship academic event with international reputation. This year, we have received almost 1000 submissions from more than 26 countries. Along with our events in conjunction, more than 500 oral and poster presentations is scheduled with expected 700 participants gather in the event.

On behalf of QiR 2017 committee, we would like to thank all of our speakers, participants, contributors, partners and professional associations for their generous contributions. We also would like to acknowledge the support from our International Advisory Board members and distinguished reviewers. Last but not least, a special thanks to our local co-organizer, Universitas Udayana and Politeknik Negeri Bali.

We wish all of you a productive and rewarding conference, also a pleasant and memorable stay in Nusa Dua, Bali, Indonesia.

Thank you and we hope to see you again in QiR 2019.

Ardiyansyah, Ph.D.

General Chair of QiR 2017 Organizing Committee

QIR



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The concept of sustainable prefab modular housing made of natural fiber reinforced polymer (NFRP)

Setyowati E. 🖾 ; Pandelaki E.E. 🖳 Save all to author list

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This research aims to formulate the concept of public housing based on research results on natural fiber reinforced polymer (FRP) material which has been done in the road map of research. Research output is the public housing design and specifications of FRP made of water hyacinths and coconut fiber. Method used is descriptive review of the concept based on references and material test which consists of density, water absorption, modulus of rupture (MOR), tensile strength, absorption coefficient and Sound Transmission Loss (STL). The entire tests of material were carried out in the laboratory of materials and construction, while the acoustic tests carried out using the impedance

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tubes method. The test results concluded that the FRP material may have a density between 0.2481 -0.2777 g/cm³, the absorption coefficient is average of 0.450 - 0.900, the Modulus of Elasticity is between 4061 - 15193 kg/cm², while the average of sound transmission loss is 52 - 59 dB. Furthermore, that the concept of public housing must be able to be the embryo of the concept of environmentfriendly and low emissions housing. © Published under licence by IOP Publishing Ltd.

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Studies of the water adsorption on Lampung's natural zeolite of Indonesia for cooling application

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Abstract. Part of minerals that originally formed from volcanic rock and ash layers reacting further with alkaline groundwater is called natural zeolite, where its sources are not always available in all countries. Indonesia is located in the ring of fire which have a huge sources of zeolite, one of the area is Lampung, South Sumatra. Natural zeolite has been considered as one of potential heat adsorbent medium which can contribute to the energy consumption and reduce air pollution in the using of cooling application. The characteristic of this Lampung natural zeolite such as adsorption kinetics, adsorption water uptake, and adsorption capacity were test with ASAP 2020 system. Sorption kinetics by this experiment of zeolite samples were carried out in a constant temperature and humidity chamber. The chamber can supply constant air condition with deviations of ± 0.5 °C for temperature and $\pm 3\%$ for relative humidity. The data based on rate of adsorption and the defined working condition was set as 20°C and 70% RH. Pore volume is a significant parameter for determining the limitation of water uptake, which can describe the saturated condition of zeolite. Sorption isotherm models used to describe sorption phenomena are commonly deduced from the Polanyi potential theory were investigated. The water adsorption quantity increased with the increase of relative pressure. To sum up, this pure zeolite has a less heat and mass transfer performance so its need to be activated before using in cooling application to get their great potential and by being coated in a desiccant heat exchanger systems.

1. Introduction

The use of natural zeolite from Indonesia as an adsorbent for cooling application can be a huge alternative energy resources for energy conservation and environmentally protection. Natural zeolites are scattered in several regions in Indonesia on more than twenty places in Indonesia among others in Sumatra, Java and East Nusa Tenggara because it's spread on the land near the volcanic mountains [1] with lots of mordenit and klinoptilolit type [2]. More research show that a lot of it using for other needs.

Nowadays, widely utilization of natural zeolite in Indonesia have been applied in agriculture, livestock, fisheries and some industries [3]. However, there is a research about natural zeolite in Indonesia as a adsorber in CO2 capture modified with Na+ to achieve the higher of adsorption capacity was conducted [4]. Besides, the research of chromium (VI) waste adsorption by zeolite has done by isotherm adsorption method to determine maximum capacity of zeolite to chromium (VI) waste [5]. Subsequent work by [6] and [6] show about conversion of palm oil into bio gasoline using Ni/ZA or natural zeolite catalyst and Cr/ZA catalyst on the conversion reaction of waste cooking oil into liquid fuel. In addition, the dehydration process on the bioethanol purification using natural zeolite result the purity more than 99% but has lower yield and much ethanol can be absorbed by natural zeolite from Gunung Kidul which could be seen from the addition of adsorbent weight by

The floating houses of Sintang City: space, resources and political nexus	012003
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Preparation of hollow mesoporous carbon spheres and their performances for electrochemical applications

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Abstract. Hollow carbon materials have received intensive attention for energy storage/conversion applications due to their attractive properties of high conductivity, high surface area, large void and short diffusion pathway. In this work, a novel hollow mesoporous material based on carbide-derived carbon (CDC) is presented. CDC is a new class of carbon material synthesized by the selective extraction of metals from metal carbides. With a twostage extraction procedure of carbides with chlorine, firstly hybrid core-shell carbon particles were synthesized, i.e. mesoporous/graphitic carbon shells covering microporous/amorphous carbon cores. The amorphous cores were then selectively removed from particles by a careful oxidative treatment utilizing its low thermal characters while the more stable carbon shells remained, thus resulting hollow particles. The characterization methods (e.g. N₂ sorption, Raman spectroscopy, temperature-programmed oxidation and SEM) proved the successful synthesis of the aspired material. In electric double-layer capacitor (EDLC) testing, this novel hollow core material showed a remarkable enhancement of EDLC's rate handling ability (75% at a high scan rate) with respect to an entirely solid-mesoporous material. Furthermore, as a fuel cell catalyst support the material showed higher Pt mass activity (a factor of 1.8) compared to a conventional carbon support for methanol oxidation without noticeably decreasing activity in a long-term testing. Therefore, this carbon nanostructure shows great promises as efficient electrode materials for energy storage and conversion systems.

Keywords: Carbide-derived carbon, Electric-double layer capacitors, Hollow carbon spheres, Methanol oxidation

1. Introduction

Porous carbons play an important role in electrochemical applications. They have been used as electrode material of electric double-layer capacitors (EDLC) and catalyst support for fuel cell electrodes [1]. Hollow carbon spheres are types of structured carbon materials which have received much attention. This is due to their attractive properties of high surface area, large void and short diffusion pathway [2]. A common method to synthesize hollow carbon sphere is templating routes using polymeric materials as carbon precursors [3,4]. Nevertheless, with this method, typically a low degree of carbon ordering results (amorphous structures). Therefore, the produced material features



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