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Hydrodynamic Studies of Two-Phase Liquid-Liquid Slug Flow in Circular Microchannel with T-Junction

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Abstract. Microreactors have a wide application, especially in heterogeneous reactions limited by mass and or heat transfer. In many chemical reactions, microreactors show good performance for obtaining a high yield, selectivity, and conversion up to 100%, which is not easy to realize using conventional reactors. The excellent performance of the microreactor is a result of the high stability of two phase flow, namely slug flow pattern. A comprehensive study of slug flow characteristics inside the microchannel is needed to have a good performance. For that reason, the present work focused on the study of slug flow characteristics and its stability by using a circular microtube with 0.5; 0.8, and 1 mm inside diameter, and the 2-liquid phase consisted of aquades-kerosene and aquades-ethyl acetate with aquades as a dispersed phase and kerosene or ethyl acetate as a continuous phase. These liquids represent two liquid mixtures with different physical and chemical properties, which significantly influence the formation of 2-phase flow patterns in a microtube. Variables used in the experiment were temperature, channel diameter, and volumetric flow rate. Observation results show that the slug flow pattern was found at the ratio of the volumetric flow rate of disperse phase to the continuous phase (*Qd/Qc*) is 1; 1.4; 1.8; and 2.2. The slug flow formed at a flow rate of 70 ml/h for both the dispersed phase and the continuous phase (*Qd/Qc* = 1) had the most stable droplet length and the distance of consecutive droplets. Increasing *Qd/Qc* ratio increases the droplet length formed, and in the range of discharge used, the change in inside tube diameter from 0.5 to 1 mm does not change the flow pattern model, but it affects the slug length.

Keywords: *microchannel, two-phase, flow pattern, stability, slug flow*

Abstrak. Teknologi *microreactor* memiliki aplikasi yang sangat luas, terutama pada reaksi heterogen yang dibatasi oleh perpindahan massa dan atau panas. Dalam banyak reaksi kimia, penggunaan *microreactor* telah mampu menghasilkan *yield* dan selektivitas yang tinggi dan bahkan konversi reaksi sebesar 100%, yang mana hasil ini sangat sulit dicapai dengan menggunakan reaktor konvensional. Kinerja unggul yang ditunjukkan oleh *microreactor* merupakan hasil dari pola aliran dengan kestabilan yang tinggi, yaitu pola aliran slug. Untuk dapat memanfaatkan kinerja unggul yang ditawarkan secara optimal, perlu dilakukan studi komprehensif tentang karakteristik pola aliran slug dalam *microchannel*. Karena itulah studi dalam penelitian ini memfokuskan pada pemahaman karakteristik pola aliran slug, serta kestabilannya. Percobaan dilakukan dengan menggunakan 2 fase liquid yang masing-masing bekerja sebagai fase terdispersi dan fase kontinu, yaitu air-kerosen dan air-etilasetat dengan sifat fisik dan kimia yang berbeda. Variabel suhu, diameter *channel*, laju alir liquid dipelajari pengaruhnya terhadap panjang slug dan jarak antar slug berdekatan yang terbentuk. Hasil observasi menyatakan bahwa pola aliran slug terbentuk pada rasio *Qd/Qc* sebesar 1; 1,4; 1,8; 2,2. Pola slug yang terbentuk pada debit 70 ml/jam baik untuk fase terdispersi maupun fase kontinu (pada *Qd/Qc* = 1) memiliki panjang droplet dan jarak antar droplet yang paling stabil. Peningkatan rasio *Qd/Qc* meningkatkan dimensi panjang droplet yang terbentuk, dan pada range debit yang digunakan perubahan diameter tube tidak merubah jenis pola aliran yang terbentuk, namun berpengaruh terhadap panjang slug.

Kata kunci: *microchannel, dua fase, pola aliran, kestabilan, aliran slug*

INTRODUCTION

Microreactor is a novel chemical reactor technology which has an excellent performance in carrying out a chemical reaction. This technology in many chemical synthesis applications mainly for heterogeneous systems has produced high yields and reaction conversions up to 100%. The heterogeneous reaction needs a large contact surface area to achieve optimal results. On the other hand, the conventional reactor can only provide a contact surface area (expressed as specific surface = A/V) of 400 m2/m3, far below the specific surface that can be provided by a microreactor which is 40.000 m^2/m^3 in the range channel diameter 10 μm – 1mm.

Another excellent performance is shown concerning to the hazardous and toxic chemicals applications. In an industrial chemical processes, the product of chemical reaction that involves small volumes has been able to prevent and avoid the risks posed by the use of hazardous and toxic materials in the process. The availability of a substantial specific surface in the miniaturization system of reactor has facilitated a mass/heat transfer process; therefore, the risk of work accidents such as explosions due to heat accumulation in a reactor can be prevented. The large specific surface in a microreactor has made the microreactor very suitable for applications in highly exothermic or endothermic processes that are limited by mass and or heat transfer.

The performance of a two-phase (liquid-liquid) microreactor is determined by the flow pattern type and the stability of flow formed within a channel. Among the flow patterns type that may develop in a channel, slug is the most stable flow pattern, has a regular velocity, uniform shape and distribution, with the slug length in several times of the inner diameter of the channel. Besides having high stability, slug flow pattern has a large specific surface area (A/V).

Several factors influence the formation of flow patterns in a microchannel, including the liquid viscosity and density, the wetting properties on the inner wall of channel, the contact angle, surface tension, the flow rate of the dispersed and continuous phase, the inner diameter of the channel, and the channel material. Previous researchers have carried out many studies on the effect of channel diameter on the flow pattern formed [1][2][3] using PTFE, PMMA, and glass channel [2][3][4][5]. The effect of liquid-liquid flow rate [4][6][7] with the different type of liquid used to represent the effect of liquid viscosity [2][3][4][8]. The droplet length and distance between successive droplets on slug flow has been investigated [4][5]. The studies are still limited to using PTFE, PMMA, and glass tube channel materials and several types of liquid phases as dispersed/continuous phases. Profound observation using various types of liquid, tube diameter, tube material, and flow rates will enrich the results of existing research. Understanding the flow pattern characteristics within a microchannel is necessary to get optimal results and it will be a significant consideration for determining a microchannel design. Therefore, this study aims to determine the effect of the flow rate of dispersed and continuous phase, the diameter of a microtube on flow pattern, the droplet length, and the distance between successive droplets on the slug flow. This study has focused on observing the flow pattern formed in a microchannel (without reaction) by using a variation of channel diameter (silicone) which has not been done in previous studies [1][2][4][9].

EXPERIMENTAL METHODOLOGY

The experiment was carried out with four variables: the flow rate of the dispersed and continuous phase, the components of liquid-liquid phase, temperature, and microchannel diameter. The flow rate and the components of liquid-liquid used in the experiment are shown in tables 1 and 2 below.

TABLE 1. Aquades-kerosene flow rate

Liquid	Flow Rate (ml/hour)				
Aquades	25	35	45	55	70
Kerosene	25	25	25	25	70

TABLE 2. Aquades-ethyl acetate flow rate

Liquid	Flow Rate (ml/hour)				
Aquades	25	35	45	55	70
Ethyl acetate	25	25	25	25	70

The experiment was performed at various temperatures of 28, 35, 40, 45, and 50 ℃, with channel diameters of 0.5; 0.8; and 1 mm, and 4.5 m channel long. The channel used in the experiment is tube silicone (circular microchannel).

TABLE 3. Liquid properties

Liquid	Temperature (℃)	Density (kg/m^3)	Viscosity (kg/m.s)	Surface Tension (kg/s^2)
Aquades	28	996.24	0.836×10^{-3}	0.02375
	35	993.97	0.723×10^{-3}	-
	40	992.25	0.656×10^{-3}	-
	45	995.16	0.599×10^{-3}	-

	50	988.07	0.549×10^{-3}	-
	28	803.00	2.200×10^{-3}	0.02000
	35	797.00	1.950×10^{-3}	-
Kerosene	40	794.00	1.750×10^{-3}	-
	45	791.00	1.600×10^{-3}	-
	50	787.00	1.500×10^{-3}	-
	28	890.58	0.450×10^{-3}	0.07280
	35	881.60	0.415×10^{-3}	-
Ethyl acetate	40	875.50	0.390×10^{-3}	-
	45	869.40	0.370×10^{-3}	-
	50	863.20	0.350×10^{-3}	-

The immiscible liquid-liquid two-phase system was delivered by two low discharge syringe pumps, Yamamoto Giken YG-80 syringe pump that can deliver liquid phase in the range of 0.1 – 99 ml/hour, and Infusia SP7s syringe pump that can flow liquid phase in the range 0.010 – 999 ml/hour. The syringe pumps in this observation perform well in dispensing liquids with uniform and stable discharge. Observation of flow pattern was carried out with a 12 W LED light, and a digital camera (Sony A6000, 50 mm f1.8 lens and macro tube extension) connected to a computer, so that the flow pattern formed can easily be observed. Two computer programs applied are OBS and GIMP. The OBS program was to observe the flow patterns, and the GIMP was used to measure the dimensions of droplet length and droplet distance.

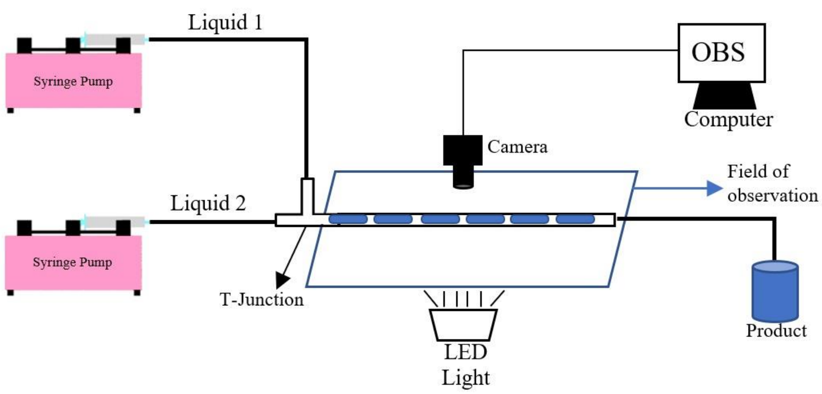
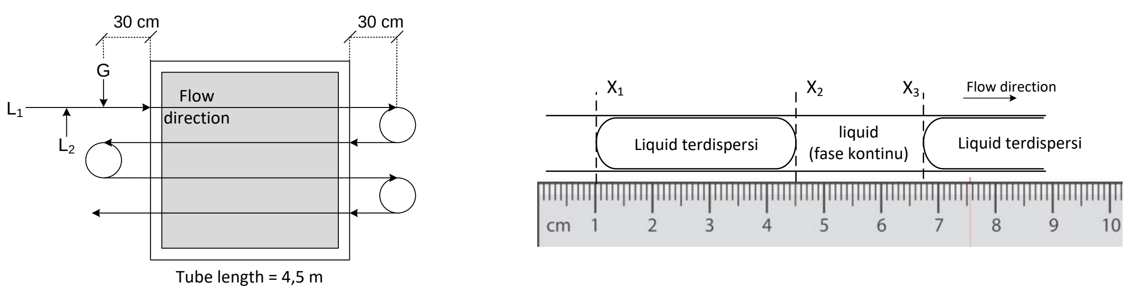


FIGURE 1. Experimental set-up



(a) (b)

FIGURE 2. (a) The flow pattern observation scheme,
(b) The measuring method of droplet length and droplet distance

The principle of the experiment is to make a contact with the two-phase liquid-liquid through T-junction (transparent material), therefore the formation of the flow pattern can be observed clearly. The experimental set-up is shown in the following Fig. 2.

RESULTS AND DISCUSSION

Liquid-liquid two-phase flow patterns in microtube can be classified into slug flow, droplet flow, thread flow, jet flow, and annular flow [9]. From these flow patterns, slug shows the stable flow characteristics and has excellent potential for developing process applications involving mass and or heat transfer, especially highly exothermic and endothermic processes. Therefore, this study focuses on observing the characteristics of slug flow pattern.

The slug flow formation is divided into the blocking, squeezing, and lag steps, as shown in Fig. 3 [7]. In the blocking step, the continuous and dispersed phases meet at the T-junction, and the dispersed phase tries to enter and penetrate to the main channel. The squeezing step can be described as the dispersed phase successfully entering the main channel, and the lag step is the step when droplets have formed.

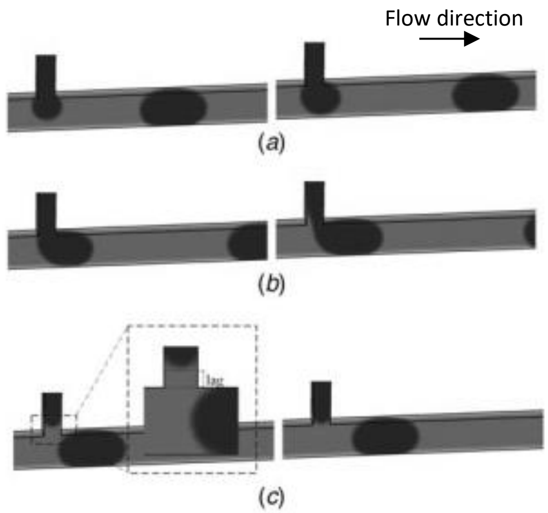


FIGURE3. Slug flow formation steps
(a) Blocking, (b) Squeezing, (c) Lag [7]

Determination of flow rate is significant to get the right flow pattern. In this observation, slug flow formed when the dispersed and continuous phase flow rate ratio is 1; 1.4; 1.8, and 2.2 (Table 1 and 2).

Liquid-Liquid Two-Phase Flow Pattern-Regime Slug Flow

Slug flow is characterized by a fragmented flow pattern between the dispersed and the continuous phase, as shown in Fig. 4. The formation of slug begins at the meeting point of the dispersed and the continuous phase at T-junction. Fig. 4 shows the slug flow pattern on a microtube with 0.8 mm inside diameter, tube length (*Lt*) of 4.5 m with a meander channel configuration so that the microtube is like to be divided into four rows, with the 1st channel being the closest channel with the inlet section.

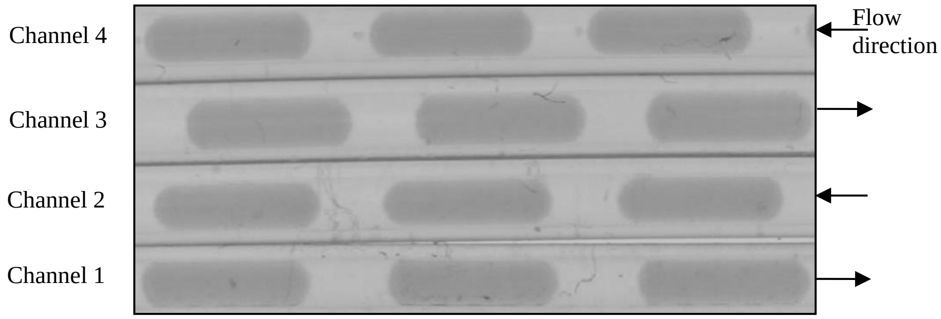


FIGURE 4. Slug flow pattern in aquades-kerosene, Q_{aq}=25 ml/hour, Q_{ke}= 25 ml/hour, D_t= 0,8 mm, T= 28 °C

The wetting property of liquid is a factor that determines the characteristics of the flow pattern formed. Interactions between the dispersed and the continuous phase with the inner surface of the tube wall determine the formation of a thin liquid film in a narrow space between the droplet and the inner tube wall.

In some previous works on the two-phase liquid-liquid system [1][6],the thin liquid film appeared in the observed system, whereas other studies [2][4][6] cannot detect the appearance of the liquid film within a slug flow pattern. The formation of the thin film is shown in the schematic Fig.5 (b).

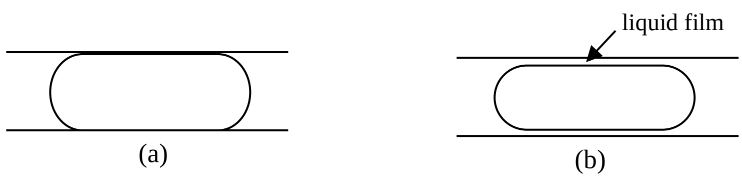


FIGURE 5.(a) Droplet without film, (b) Droplet with film [9]

Experiments using aquades-ethyl acetate formed droplets with a film, whereas in the aquades-kerosene system, liquid droplets formed without a film (Fig. 5(a)). Ethyl acetate, as the continuous phase in the first liquid, pairs wetting the inner tube wall, while kerosene in the second liquid, pairs wetting the inner tube walls. In the aquades-kerosene system, it can be formed as a thin film but is not observed due to visual limitations. In many cases, particularly those involving mass and heat transfer, film formation is more advantageous than flow patterns without films because the appearance of these films increases the interfacial mass/heat transfer rates. S is the surface area of the droplet where the mass/heat transfer happens, and V is the enclosed droplet volume. In a flow pattern without film, the mass/heat transfer process occurs in the zone between two droplets, in an area between the heads and tails of successive droplets. However, in the flow pattern with film, a mass transfer does not only occur in that zone but also in the thin liquid film.

Effect of Inner Diameter of Microtube to Liquid-Liquid Flow Pattern

Two-phase flow patterns in aquades-kerosene and aquades-ethyl acetate with both dispersed and continuous phase flow rates of 25 ml/hour in different tube diameters are shown in Fig. 6. Fig. 6 shows that for a constant flow rate (25-25 ml/hour) at various tube diameters, it formed the same flow pattern, slug flow. Thus, at a constant flow rate, the different tube diameter in this experiment does not affect the flow pattern type but rather the droplet length formed. At a certain flow rate, changes in tube diameter can cause changes in the type of flow pattern from slug flow to annular flow. From the measurement of the droplets formed, in the aquades-kerosene system with a constant flow rate of 25-25 ml/hour, the average length of droplets formed on a 0.5 mm diameter tube is 10.074 mm, tube diameter of 0.8 mm is 4.523 mm, and a tube with a diameter of 1 mm is 3,129 mm. At a constant flow rate, the tube diameter is getting larger, the shorter of the droplet length.

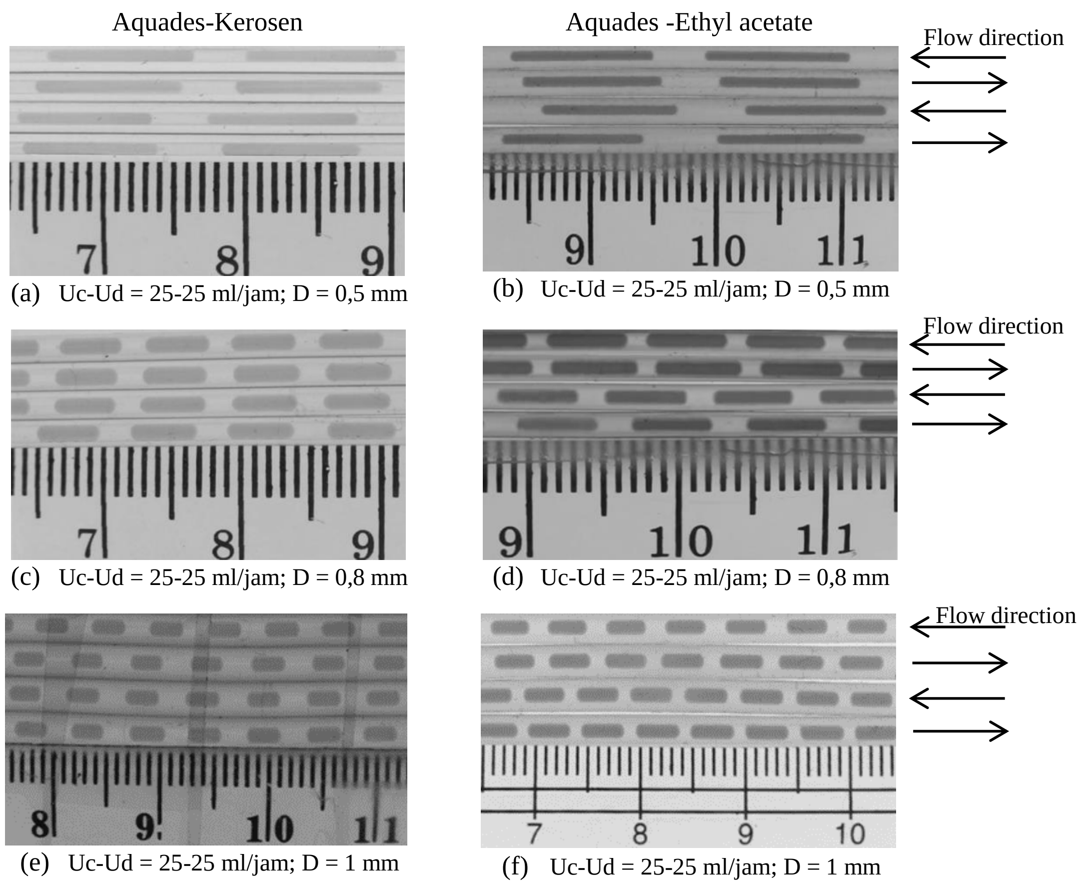


FIGURE 6. (a), (c), (e) Flow pattern in aquades-kerosen;
(b), (d), (f) Flow pattern in aquades-ethyl acetate

The Stability of Slug Flow Pattern

The channel used in this observation was arranged into four rows. Fig. 7-9 shows the droplet profile within the microtube.

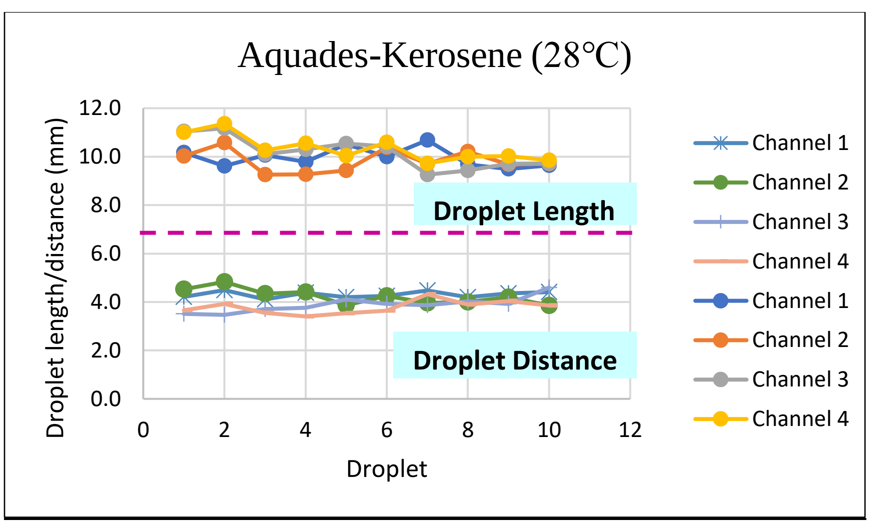


FIGURE 7. Droplet dimension profile in aquades-kerosene U_d-U_C= 25-25 ml/hour (stable flow)

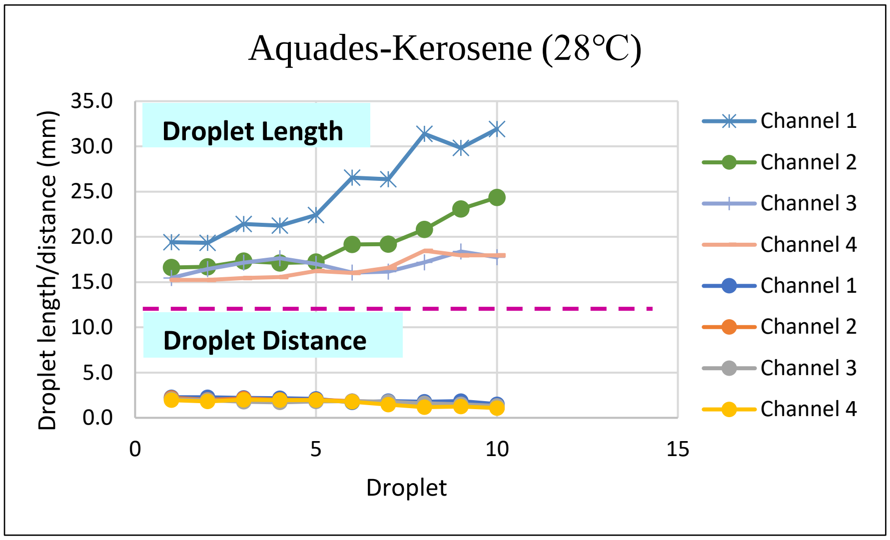


FIGURE 8. Droplet dimension profile in aquades-kerosene U_d-U_C= 35-25 ml/hour (unstable flow)

The difference in droplet length of about 1 mm from the average dimension indicates that the flow pattern within the microtube is stable. The more significant droplet length difference means the flow pattern's lower stability.

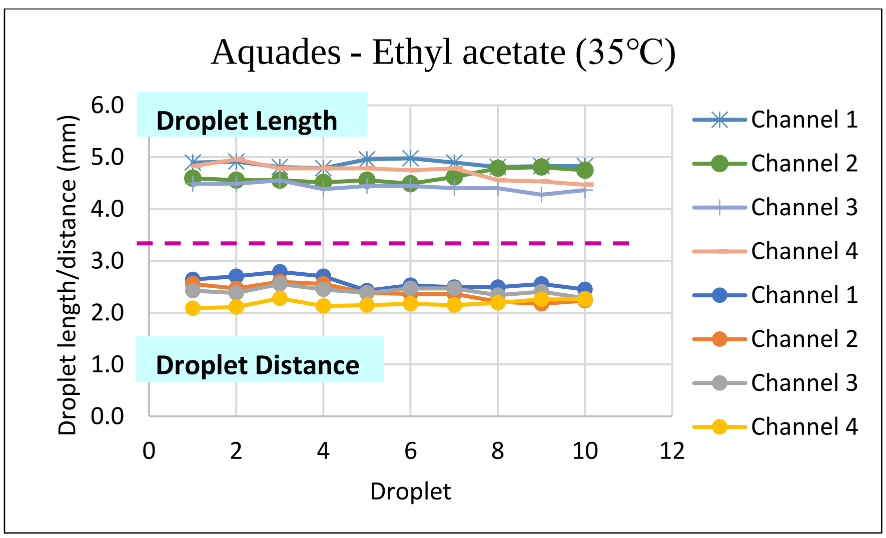


FIGURE 9. Droplet dimension profile in aquades-ethyl acetate U_d-U_C=70-70ml/hour (stable flow)

The difference in droplet length, which is quite prominent in the microtube, is difficult to explain. The occurrence of this phenomenon may be caused by the pump's performance, which is not stable during pumping the two liquid phases, and another one is the coalescence phenomenon, mainly for tubes with huge length dimensions.

The Effect of the Linear Velocity Ratio of Dispersed to Continuous Phase (*Ud/Uc*) to Droplet Length (L_b)

TABLE 4. Effect of *Ud/Uc* to L_b in aquades-kerosene

Ud/Uc	Droplet Length			
	Channel 1	**Channel 2**	**Channel 3**	**Channel 4**
1	9.9638	9.8234	10.1681	10.3404

1.4	24.9872	19.1574	16.9298	16.4766
1.8	15.1936	15.6255	16.0043	16.3915
2.2	18.3106	18.1787	17.9872	18.9128

TABLE 5. Effect of *Ud/Uc* to L_b in aquades-ethyl acetate

Ud/Uc	**Droplet Length**			
	Channel 1	**Channel 2**	**Channel 3**	**Channel 4**
1	10.2000	9.7766	9.8170	9.8766
1.4	11.6957	11.6106	11.5447	12.0000
1.8	13.5787	12.7511	13.3340	12.8915
2.2	14.5957	13.5957	14.3617	14.3617

The larger *Ud/Uc* ratio was obtained by increasing the flow rate of aquades to the same flow rate of continuous phase increases in the droplet length dimensions in each microchannel. Table 4 indicates that an increase in two folds of the *Ud/Uc* ratio can increase the droplet length (*Lb*) by two times. This tendency is shown by the droplets on each microchannel. However, the effect of increasing the *Ud/Uc* ratio differs from the results shown in Table 5, i.e., an increase in the ratio up to 2 times can only increase 1.5 times the droplet length.

Bubble Length Follows Garstecky Model

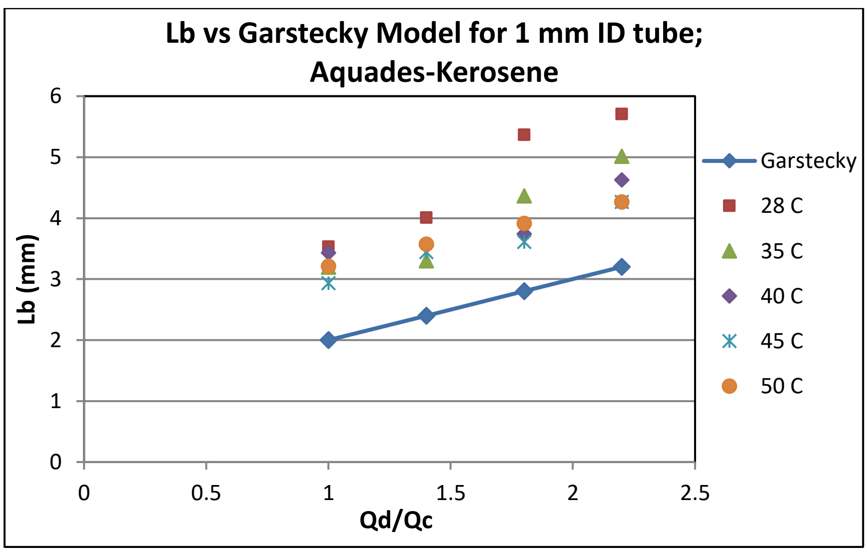


FIGURE 10. The comparison of the experimental droplets length and Garstecky model for aquades-kerosene system, 1 mm inside diameter of the tube

The droplet length at the inlet section of the main channel has the dimension as shown in Fig. 10 and 11, Each for pairs of 2 liquid-liquid phases from aquades-kerosene and aquades-ethyl acetate. Garstecky, in the previous study, had formulated the correlation between the length of droplets (*Lb*) formed in the T-junction on the various ratio of dispersed phase to continuous phase (*Qd/Qc*) following the equation as below: with *Qd* = debit of the dispersed phase, *Qc* = debit of the continuous phase, W_{in} = channel diameter in the inlet section of the dispersed phase (aquades), and *W* = diameter of the main channel.

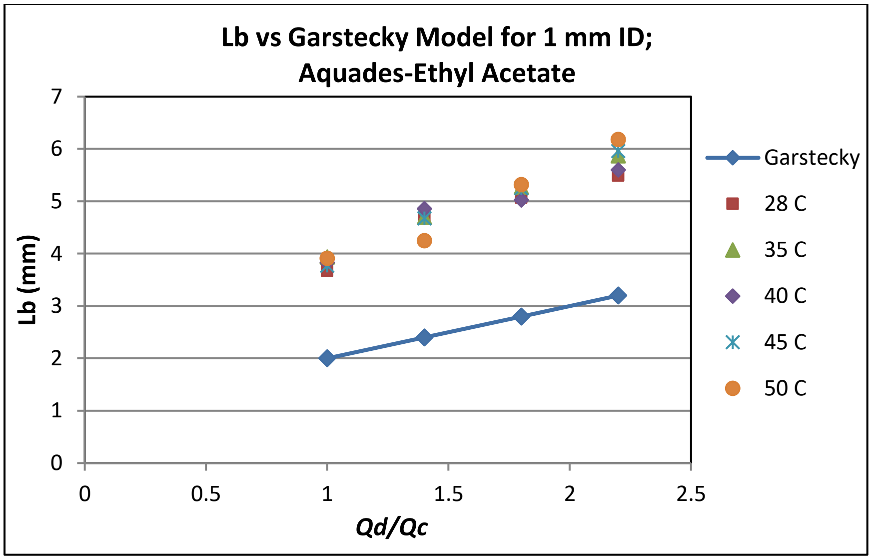


FIGURE 11. The comparison of the experimental droplets length and Garstecky model for aquades-ethyl acetate system, 1 mm inside diameter of the tube

When compared, the length of experimental droplet characteristic is appropriate to the proposed model by Garstecky, while the increase in *Qd/Qc* will be followed by the increase in the droplet length (*Lb*) with a linear trend. However, the value of *Lb* experiment and *Lb* based on this model was not the same. There are some possible factors: i.e., the Garstecky model has not considered the type of material channel, the liquid wettability to the inner wall of a microchannel, and the physical property such as liquid density and viscosity of the liquid that is used in the experiments.

Dimensionless Numbers

Capillary number, Reynold number, and Weber number are dimensionless numbers explaining the effect of three dominants force in a microchannel system; consist of inertial force, viscous force, and surface tension force. By comparing these dimensionless numbers, it will be known the influence of dominant force or less dominant in a slug flow formation of liquid-liquid system. The capillary number represents the ratio of the following forces [10]:

$$Ca = \frac{viscous force}{surface tension force} \quad (1)$$

The capillary number in this experiment is in the range of 6.68×10^{-5} – 8.719×10^{-3} (Ca < 1). The value of capillary number below 1 indicates that surface tension force works more dominant than viscous force.
Reynold number represents the ratio of inertial forces to viscous force as in the following equation [10]:

$$Re = \frac{inertial\ force}{viscous\ force} \quad (2)$$

Reynold number experiment is in the range of 3.2289 – 122.1798 (Re > 1). The value of Reynold number higher than 1 indicates that inertial force works more dominant than viscous force.
Weber number represents the ratio of inertial force to surface tension force as in the following equation [10]:

$$We = \frac{inertial\ force}{surface\ tension\ force} \quad (3)$$

Weber number in this experiment is 1.062×10^{-3} – 1.841×10^{-1}(We < 1). Weber number below 1 indicates that surface tension force works more dominant than inertial force. Based on the value of Capillary number, Reynold number, and

Weber number, the influence of these forces on the liquid-liquid system of aquades-kerosene and aquades-ethyl acetate has the following order: surface tension force > inertial force > viscous force.

CONCLUSION

The slug flow hydrodynamic was investigated in a circular silicone microchannel with an inside diameter of less than 1 mm. The tube diameter in these experiments (0,5; 0,8; 1 mm) didn't affect the flow pattern type; it affected the droplet length and the distance of successive droplets. The increased channel diameter has brought on the lower droplet length. The slug flow pattern formed when the flow velocity ratio of the dispersed to continuous phase (*Ud/Uc)*= 1; 1,4; 1,8; 2,2. The greater value of *Ud/Uc* has resulted in the length of droplets within the microchannel. The various flow velocity use in these experiments consist of *Uc* = 25; 70 ml/hour, *Ud* = 25; 35; 45; 55; 70 ml/hour entirely formed slug flow pattern.

The higher temperature may influence the droplet lengths and the distances of successive droplets. The temperature has a correlation to the viscosity of liquid-liquid two-phase flow. Further, the droplet length showed the same trend as the length obtained by Garstecky model.

The dimensionless numbers consisting of Capillary Number, Reynold Number, and Weber Number are able to explain the influence of three dominant forces, i.e., surface tension force, inertial force and viscous force in a micro system.

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Abstract

Microreactors have a wide application, especially in heterogeneous reactions limited by mass and or heat transfer. In many chemical reactions, microreactors show good performance for obtaining a high yield, selectivity, and conversion up to 100%, which is not easy to realize using conventional reactors. The excellent performance of the microreactor is a result of the high stability of two phase flow, namely slug flow pattern. A comprehensive study of slug flow characteristics inside the microchannel is needed to have a good performance. For that reason, the present work focused on the study of slug flow characteristics and its stability by using a circular microtube with 0.5; 0.8, and 1 mm inside diameter, and the 2-liquid phase consisted of water-kerosene and water-ethyl acetate with water as a dispersed phase and kerosene or ethyl acetate as a continuous phase. These liquids represent two liquid mixtures with different physical and chemical properties, which significantly influence the formation of 2-phase flow patterns in a microtube. Variables used in the experiment were temperature, channel diameter, and volumetric flow rate. Observation results show that the slug flow pattern was found at the ratio of the volumetric flow rate of disperse phase to the continuous phase (Q_D/Q_C) is 1; 1.4; 1.8; and 2.2. The slug flow formed at a flow rate of 70 ml/h for both the dispersed phase and the continuous phase (Q_D/Q_C = 1) had the most stable droplet length and the distance of consecutive droplets. Increasing Q_D/Q_C ratio increases the droplet length formed, and in the range of discharge used, the change in inside tube diameter from 0.5 to 1 mm does not change the flow pattern model, but it affects the slug length.

Keywords: microchannel, two-phase, flow pattern, stability, slug flow

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102 Tahun ITB – Pendidikan Tinggi Teknik di Indonesia

Book of Abstracts

STKSR 2022
Ambon, Indonesia

International Seminar on Chemical Engineering Soehadi Reksowardojo (STKSR) 2022

Hybrid Conference

"Building Indonesia Through the Development of Appropriate Technology for Archipelagic Country"

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9 – 10 August 2022

Organized by:

About STKSR 2022

International Seminar on Chemical Engineering Soehadi Reksowardojo (STKSR) 2022

International Seminar on Chemical Engineering Soehadi Reksowardojo (STKSR) is an annual seminar held by the Department of Chemical Engineering ITB in honour of Prof. Soehadi Reksowardojo’s contribution to the early developments of chemical engineering higher education in Indonesia. This year STKSR 2022 will be held in Ambon, Indonesia and by virtual conference, starting from August 9th to August 10th, 2022. Bringing forward the theme “Building Indonesia Through the Development of Appropriate Technology For Archipelagic Country”, we would like to invite scholars and practitioners from all around the world to contribute to these seminars.

Technological advances from the effects of globalization have provided changes for the better in human civilization, including in Indonesia. Unfortunately, this progress has not been felt evenly, especially among the Indonesian people who live on small islands. As we know, the distribution of electricity and clean water in Indonesia has not yet reached 100 percent. Development in the country is also still concentrated in areas with big cities so many people in remote areas are still left behind. The natural resources of each island are different and natural commodities are not sufficient so resources from other islands are needed. It is undeniable that the form of an archipelagic state makes access to the exchange of natural resources more limited. Indonesia as a maritime country also still has problems with a mindset that is focused on development on the mainland. Natural resources that are appropriate to be taken are sufficient to advance and even meet energy and material needs because technology has not yet been applied to process resources. Therefore, efforts are needed to develop appropriate technology to adapt to the geographical conditions of the country so that the sea acts as a land separator.

This seminar is purposed to campaign technological breakthroughs for archipelagic countries and become a form of ITB Chemical Engineering's contribution to national development. To find comprehensive ideas and formulations for the development of technology for the process of providing energy and resources in the archipelago, synergy is needed between stakeholders, including the community, academics, entrepreneurs, and the government. This synergy can be realized in a conference such as the 2022 STKSR as a forum to facilitate Indonesia's future interests in the development of technology in archipelagic countries.

Contents

Scientific Committee

- **Prof. Dr. Ir. Subagjo**
  Institut Teknologi Bandung, Indonesia
- **Prof. Dr. Iftekar Abubakar Karimi**
  National University of Singapore, Singapore
- **Prof. Ir. Dwiwahju Sasongko, Ph.D.**
  Institut Teknologi Bandung, Indonesia
- **Prof. Dr. Ir. Herri Susanto**
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  Institut Teknologi Bandung, Indonesia
- **Prof. Ir. I Gede Wenten, Ph.D.**
  Institut Teknologi Bandung, Indonesia
- **Prof. Ir. Johnner Sitompul**
  Institut Teknologi Bandung, Indonesia
- **Prof. Dr. Yogi Wibisono Budhi**
  Institut Teknologi Bandung, Indonesia

Organizing Committee

STKSR Chairman:
Jenny Rizkiana, Ph.D, Institut Teknologi Bandung, Indonesia

Co-Chairman:
Anggit Raksajati, Ph.D. (ITB)

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Dr. Anita Kusuma Wardani
Dian Shofinita, Ph.D.
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Tua Doras
Alfira Sita Maharsi
Priscilla Catherine Angelita
Ni Made Dewi Sri Anggaraeni
Muhammad Alfath Chaniago
Sendi Setiawan
Habibil Ghifary El Imam
Dorotea Evania Silitonga

Speech of Rector Institut Teknologi Bandung

On behalf of Institut Teknologi Bandung, we welcome the honorably keynote speakers, invited speakers, speakers and all participant to the International Seminar on Chemical Engineering Soehadi Reksowardojo (STKSR) 2022. We also thanks Universitas Pattimura Ambon for the collaboration on this event, which brings theme of "Building Indonesia through the Development of Appropriate Technology for Archipelagic Country".

As mentioned in the seminar title, Prof. Ir. Soehadi Reksowardojo is a prominent figure in ITB, who brought the concept of "Tri-Soko-Guru" for higher education. The "Tri-Soko-Guru" means three main pillars, consist of education, research, and industry affiliation. The concept then nowadays evolves into "Tri Dharma Perguruan Tinggi" of education, research, and community service. In accordance with ITB's mission to guide the change that able to improve welfare of Indonesian and the world, The Tri Dharma Perguruan Tinggi bridge innovation on the research to real implementation on the industry and society. As we know, the innovation is the key aspect to avoid the middle-income trap. The researches as a core of innovation therefore should explore uniqueness of Indonesia and each country to develop a competitiveness.

Archipelagic country, such as Indonesia, has advantages as well as different set of technology challenges compare to the continent countries. With abundant of natural resources at sea, we need a specific technology to process them into a useful goods. In example, microalgae as a source of food and oil for biodiesel, is a competence agent for CO_2 reduction in atmosphere. The oil extraction process from the microalgae should overcome high water content, differentiate the technology from the other oil sources extraction such as palm oil. This seminar is a way to disseminate the research's results and to collaborate among the researcher, thus able to increase readiness level of the technology.

We believe this seminar will be fulfilled with fruitful discussions and innovative technologies that suitable for the archipelagic countries. Finally, we express our highest gratitude and appreciation to our sponsors, collaborators, committees, and participants who greatly contribute to the success of the STKSR 2022. Hopefully, this event brings the best results for all.

Prof. Reini Wirahadikusumah, Ph.D.

Rector of ITB

Conference Topics

TOPIC 1:	Bioenergy and Alternative Energy (BAE)
TOPIC 2:	Food Engineering and Technology (FET)
TOPIC 3:	Bioprocess Engineering (BPE)
TOPIC 4:	Chemurgy and Bio-based Materials (CBM)
TOPIC 5:	Advanced Science and Materials (ASM)
TOPIC 6:	Separation Technology (ST)
TOPIC 7:	Process Simulation (PS)
TOPIC 8:	Industrial Application (IA)
TOPIC 9:	Reaction and Control Engineering (RCE)
TOPIC 10:	Chemical Engineering Education (CEE)

Keynote Speakers

Dr. Ir. I.G.B. Ngurah Makertihartha

Catalyst Expert & Scientist
Department of Chemical Engineering
Institut Teknologi Bandung

Prof. Dr. Iftekar Abubakar Karimi

Department of Chemical and Biomolecular Engineering
National University of Singapore

Ir. Jaya Wahono

Chief Executive Officer
Clean Power Indonesia

Dr. Eng. Muhammad Aziz

Associate Professor of Energy and Prosses Integration Engineering
The University of Tokyo

Dr. Dadan Kusdiana

Director General NRE&EC
Ministry of Energy and Mineral Resources

Prof. Guoqing Guan

Institute of Regional Innovation
Hirosaki University

Seminar Schedule

RUNDOWN DAY 1

Tuesday, 9th August 2022

PLENARY SESSION DAY 1 (08.00-13.45)

TIME (GMT+9/ WIT)	PROGRAM
PLENNARY SESSION (Location: Auditorium Hall)	
08.00-08.30	Registration
08.30-09.30	Singing Indonesia Raya Opening Ceremony of STKSR 2022 Report presentation from STKSR 2022 Chairman: Jenny Rizkiana, S.T., M.T., Ph.D.
09.30-09.45	Opening and Welcoming Speech by Rectorate of Bandung Institute of Technology: Prof. Ir. I Gede Wenten, M.Sc., Ph.D.
09.45-10.00	Opening and Welcoming Speech by representation of Universitas Pattimura
10.00-10.15	Coffee Break
10.15-10.45	Keynote 1: Dr. Ir. I.G.B. N. Makertihartha Associate Professor at Institut Teknologi Bandung "Chemical Reaction and Catalyst Technology"
10.45-11.15	Keynote 2: Dr. Eng. Muhammad Aziz Associate Professor at The University of Tokyo "Energy and Process Integration Engineering"
11.15-11.45	Keynote 3: Dr. Ir. Dadan Kusdiana, M.Sc. Ministry of Energy and Mineral Resource Indonesia "Biofuel Process Technology"
11.45-12.30	Q&A session
12.30-13.45	Lunch
PARALLEL SESSION (Location: Masella Building)	
13.45-15.15	Parallel Session 1
15.15-15.30	Coffee Break
15.30-17.30	Parallel Session 2
19.00	Gala Dinner

RUNDOWN DAY 2

Wednesday, 10th August 2022

TIME (GMT+9/ WIT)	**PROGRAM**
PARALLEL SESSION	**(Location: Masella Building)**
08.30-10.15	Parallel Session 3
10.15-10.30	Coffee Break
10.30-12.30	Parallel Session 4
12.30-13.30	Lunch
PLENNARY SESSION	**(Location: Auditorium Hall)**
13.30-14.00	Keynote 4: Prof. Dr. Iftekhar A. Karimi Professor at National University of Singapore "Modeling and optimization, Energy systems and energy efficiency, Planning and scheduling, Oil and gas supply chains, and Systems biology"
14.00-14.30	Keynote 5: Ir. Jaya Wahono CEO Clean Power Indonesia "Community-based biomass distributed power"
14.30-15.00	Keynote 6: Prof. Guoqing Guan Professor at Hirosaki University "Coal and biomass pyrolysis and gasification, Biorefinery, Heterogeneous catalysts for energy conversion, and Energy materials"
15.00-15.40	Q&A session
15.40-16.10	Closing remarks
16.10-16.30	Coffee Break

PARALLEL SESSION DAY ONE (13.45-17.30, Masella Building)

TIME (GMT+9)	PROGRAM					
	PARALLEL SESSION 1					
	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
13.45-14.00	**ASM-13**	**CBM-04**	**BAE-04**	**PS-02**	RCE-06	CBM-22
14.00-14.15	ASM-01	**CBM-01**	BAE-01	PS-01	RCE-07	CBM-21
14.15-14.30	ASM-02	**CBM-02**	**BAE-22**	PS-03	RCE-08	CBM-19
14.30-14.45	ASM-03	CBM-03	BAE-02	PS-04	RCE-10	ST-15
14.45-15.00	ASM-04	CBM-05	**BAE-08**	PS-05	RCE-11	ST-16
15.00-15.15	ASM-06	CBM-06	BAE-03	**PS-11**	RCE-12	ST-17
15.15-15.30	**COFFEE BREAK**					
TIME (GMT+9)	**PARALLEL SESSION 2**					
	ROOM 1	**ROOM 2**	**ROOM 3**	**ROOM 4**	**ROOM 5**	**ROOM 6**
15.30-15.45	**ASM-12**	**CBM-13**	**BAE-05**	**RCE-02**	PS-07	FET-14
15.45-16.00	ASM-07	CBM-07	BAE-06	RCE-01	PS-08	FET-16
16.00-16.15	ASM-08	CBM-08	BAE-07	RCE-03	PS-09	FET-17
16.15-16.30	ASM-09	CBM-09	BAE-09	RCE-04	PS-06	FET-18
16.30-16.45	ASM-14	CBM-11	BAE-10	RCE-05	PS-10	FET-19
16.45-17.00	ASM-10	CBM-12	BAE-11	**RCE-09**	PS-12	FET-20
17.00-17.15		CBM-23			PS-20	FET-22
17.15-17.30					PS-21	FET-23
19:00	**GALA DINNER**					

Note: Paper code that is written in bold are for paper that will be presented offline. The session in room 5 and 6 will be held fully online

PARALLEL SESSION DAY TWO (08.30-13.30, Masella Building)

TIME (GMT+9)	**PROGRAM**					
	PARALLEL II: 1st SESSION					
	ROOM 1	**ROOM 2**	**ROOM 3**	**ROOM 4**	**ROOM 5**	**ROOM 6**
08.30-08.45	**ASM-05**	**CBM-20**	**ST-11**	**FET-07**	PS-17	BPE-07
08.45-09.00	ASM-23	**CBM-10**	ST-01	**FET-08**	PS-13	BPE-08
09.00-09.15	ASM-15	CBM-14	ST-02	FET-02	PS-14	CEE-01
09.15-09.30	ASM-16	CBM-15	ST-03	FET-03	PS-15	BAE-19
09.30-09.45	ASM-17	CBM-16	ST-04	FET-04	PS-16	BAE-20
09.45-10.00	ASM-18	CBM-17	**ST-13**	FET-05	PS-18	BAE-21
10.00-10.15	**ASM-11**	CBM-18	ST-05	**FET-01**	PS-19	BAE-23
10.15-10.30	Coffee Break					
TIME (GMT+9)	**PROGRAM**					
	PARALLEL II: 2nd SESSION					
	ROOM 1	**ROOM 2**	**ROOM 3**	**ROOM 4**	**ROOM 5**	**ROOM 6**
10.30-10.45	**ASM-24**	**IA-02**	ST-08	**BPE-09**	FET-06	BAE-12
10.45-11.00	ASM-19	IA-01	ST-06	BPE-01	FET-09	BAE-13
11.00-11.15	ASM-20	IA-03	ST-07	BPE-02	FET-10	BAE-14
11.15-11.30	ASM-21	IA-04	ST-09	BPE-03	FET-11	BAE-15
11.30-11.45	ASM-22	IA-05	ST-10	BPE-04	FET-12	BAE-16
11.45-12.00	ASM-25	IA-06	ST-12	BPE-05	FET-13	BAE-17
12.00-12.15	FET-21	IA-07	ST-14	BPE-06	FET-15	BAE-18
12.15-12.30		IA-08				
12.30.13.30	Lunch					

Note: Paper code that is written in bold are for paper that will be presented offline. The session in room 5 and 6 will be held fully online

List of Accepted Abstract

Topic 1: Bioenergy and Alternative Energy (BAE)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
BAE-01	STKSR-005	Electricity Generation from Tofu Wastewater and Palm Oil Mill Effluent (POME) using Microbial Fuel Cell	**Ardiyan Harimawan**, Kenny Z. Suryaga, Putri Erna Saing, Hary Devianto, Dian Shofinita	ITB
BAE-02	STKSR-009	The Effect of Additional Redox-Active to The Gel Polymer Electrolyte on The Performance of Supercapacitor Cells	Tiara Ariani Putri, **H Devianto**, T Prakoso, P Widiatmoko, H Rustamaji	ITB
BAE-03	STKSR-014	Dye Sensitized Solar Cell Performance Analysis through Equivalent Circuit Model	Jovan Natalius Marcos, Zuma Rizka Akbar Ibrahim, **Widiatmoko, P**., Devianto, H.	ITB
BAE-04	STKSR-017	Review Article: Application of Integrated Electrodes Materials for Enhancing the Electrochemical Reduction of CO2	Hary Devianto, **Mitra Eviania**, Tirto Prakosoa	ITB
BAE-05	STKSR-031	The Effect of Illumination, Electrode Distance, and Illumination Periods on the Performance of Phototrophic Sediment Microbial Fuel Cell (PSFMC)	**Ardiyan Harimawan**, Hary Devianto , Nicholas Khodiyat, Kreszen Livianus Gatalie	ITB
BAE-06	STKSR-048	Analysis of the Behavior of Ionic Conductivity in Alkaline Gel-Solutions that Improve of The Performance Aspect of Zinc-Air Batteries	Mohammad Ghimnastiar Ulsak, T Prakoso, P Widiatmoko, P Febrianto, **H Devianto**	ITB
BAE-07	STKSR-052	Carbon Credit and Economic Feasibility Analysis of Biomass-Solar PV-Battery Power Plant for Application in Indonesia Remote Area	**Dindamilenia Choirunnisa Hardiyasanti**, Sinta Widianingrum, Aditiya Harjon Bahar, Djati Wibowo Djamari, Jaya Wahono	Sampoerna University

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
BAE-08	STKSR-056	Interaction of Biomass and Biochar of Seaweed and Apple Tree Branch in Two-Stage Co-gasification System	**Yohanes Andre Situmorang**, Guoqing Guan	ITB
BAE-09	STKSR-060	Biomass and Natural Gas Co-firing in Oxyfuel Integrated Gasification Combined Cycle	**Habibil Ghifary**, I D M Budi, and W H Saputera	ITB
BAE-10	STKSR-062	Production of Biogas from Palm Oil Mill Effluent and the Potential Utilization of Its Discharge as Fertilizer	Dian Rahmawati, **Azmia Rizka Nafisah**, Amellionora Nadya, Isna Rizkia Amalia Sholihah	ITK
BAE-11	STKSR-067	Optimizing Hydrogen Production from the Photovoltaic Powered Alkaline Water Electrolyzer	Habibil Ghifary, P Widiatmoko, H Devianto, F F Nudriansyah , J F Simorangkir	ITB
BAE-12	STKSR-077	Steam Co-gasification of Torrefied Seaweed and Land-based Biomass for Hydrogen Production	Aghietyas Choirun Az Zahra, Hirozumi Okura, Aisikaer Anniwaer, Abuliti Abudula, Guoqing Guan	Hirosaki University
BAE-13	STKSR-081	Thermodynamic Modeling of Alkali Metals Behavior and Ash Fusion in Empty Fruit Bunch and Palm Kernel Shell Combustion	Winny Wulandari, Tjokorde Walmiki Samadhi, Raihan, Muhammad Syaiful Islam	ITB
BAE-14	STKSR-087	Co-Torrefaction Modeling and Simulation in Hybrid Coal Production Process	Winny Wulandari, M Naufal Najib Sanjaya, Dion Purnama Putra, Jenny Rizkiana, Dwiwahju Sasongko	ITB
BAE-15	STKSR-092	Opportunities and Challenges in Utilizing Palm Kernel Shell as a Renewable Energy Source in Ceramic Tile Manufacturing	Charlie Dhiannova, Handaya, Herri Susanto	IPB
BAE-16	STKSR-103	Hematite-Gamma Alumina Based Solid Catalyst Development For Biodiesel Production From Palm Oil	Bryan, Edbert Gozali, Tirto Prakoso, Jenny Rizkiana	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
BAE-17	STKSR-105	MASARO INCENERATOR FOR NON BIODEGRADABLE AND NON RECYCLE WASTE HANDLING AT BABAKAN VILLAGE CIWARINGIN CIREBON	Akhmad Zainal Abidin, M I Maulana, A Aqsha	ITB
BAE-18	STKSR-114	Experimental Study on Conversion of Water Hyacinth into Solid Fuel	Maria Gabriela Kristanti, Herri Susanto	ITB
BAE-19	STKSR-115	Yield Improvement in Mobile Mini Biodiesel Plant with Solar Water Heating System Using Impregnated Zeolite (Zeolite/KOH) Catalyst	Syaifurrahman, Usman A Gani, Rinjani Ratih Rakasiwi, Wivina Diah Ivontianti, Mariabel Maura	Tanjungpura University
BAE-20	STKSR-174	Determination of Dye Sensitized Solar Cell (DSSC) Efficiency Using Photosynthetic Pigments of Tropical Marine Microalgae Navicula sp. TAD	Ivon Telussa, Eirene G. Fransina, Eka Rahmat Mahayani Anthonio Putera Lilipaly, Alfa Musa Imanuel Efruan	Pattimura University
BAE-21	STKSR-179	Process design of hydrogen energy production from glycerol through steam reforming method and optimization using response surface methodology	Muhammad Ikhsan Taipabu, Nikmans Hattu, Ervina Rumpakwakra	Pattimura University
BAE-22	STKSR-182	Thermal Characteristics of Electric Vehicle's Battery Pack	Prof. Dr. Sugeng Winardi, M.Eng., Arthanta Cracian, Umar Said, Suci Madhania	ITS
BAE-23	STKSR-188	DC Pump Performance Testing Using Solar Power	Jemmy J. S. Dethan, Fredrik J. Haba Bunga, Marten L. Lano, Arista M. Tamonob, Jonathan E. Koehuan, Marthen Makaborang, Nikodemus P.P.E. Nainiti, Arlindo Kette, David A. Abi, Hary Devianto	Artha Wacana Christian University

Topic 2: Food Engineering and Technology (FET)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
FET-01	STKSR-013	Preliminary study: Acid effect in the improvement of extraction yield and antioxidant activity in tomato	**Angela Justina Kumalaputri,** A. Rianti, G. A. Limiarto, T. Handoko	Parahyangan Catholic University
FET-02	STKSR-034	Cold Sterilization of Coconut Water by Membrane Technology and UV-C	Lienda Aliwargaa, **Helen Juliana**, Fiena Joenputria, Livia Chandraa	ITB
FET-03	STKSR-046	Life Cycle Assessment of Decaffeinated Coffee Beans Production	**Andreana Rochili**, Fiorine a	ITB
FET-04	STKSR-049	Preliminary Evaluation of Halal Gelatin Production From Indonesian Local Fish By Hydrothermal	Saepul Adnan, **M.T.A.P. Kresnowati**, Marlina, Yazid Bindar	ITB
FET-05	STKSR-050	Comparative analysis of the free phenolics, bound phenolics, total phenolics and proximate content of defatted and non-defatted rice bran	Zahara Mardiaha, Soen Steven, Dian Shofinita, **Johnner P. Sitompul**	ITB
FET-06	STKSR-119	Effect of Temperature and Duration of Mixing Red Ginger (Zingiber officinale Var. Rubrum) Extract on Soy Milk	**Maisaroh**, Priyo Atmaji, Widya Puspantari, Olivia Bunga Pongtuluran, Astuti	Badan Riset dan Inovasi Nasional
FET-07	STKSR-126	Integrated Wet Process for Coconut Protein and VCO Production	**Dianika Lestari,** Anisa Auvira, Rahmaniah Akhirunnisa	ITB
FET-08	STKSR-127	Production of Low-Digestible Sweet Potato Flour by Organic Acid and Heat Moisture Treatment (HMT)	**Dianika Lestari,** Haga Krisvint Yandani Gulo, Riza Salsabilla Qodrundnada, Dian Shofinita	ITB
FET-09	STKSR-163	Ultrasonic-assisted Extraction Optimization of the Flavonoid Compounds from Vernonia amygdalina Del. Leaves Using Response Surface Method	Buanasari Buanasari, Danu Ariono, Johnner P. Sitompul	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
FET-10	STKSR-164	Pectin Extraction from Apple Pomace (Malus domestica) as Gelatin Replacer using Living Cells with Ultrasound Pretreatment	Nurul Rahmawati, Tri Widjaja**, Setiyo Gunawan**	ITS
FET-11	STKSR-175	EFFECT OF RED GALANGAL RHIZOME (Alpinia purpurata K. Schum) EXTRACT ON HISTAMINE CONCENTRATION IN SCAD FISH (Decapterus sp.)	Fensia Analda Souhoka, Nikmans Hattu, Esrom Batlajery	University of Pattimura
FET-12	STKSR-176	ANALYSIS OF PROTEIN CONTENT AND IDENTIFICATION OF AMINO ACIDS IN FRESH AND SMOKE TUNA (Thunnus sp.)	Nikmans Hattu, Ivonne Telussa, Natalia Salatutin	University of Pattimura
FET-13	STKSR-177	COMPARATIVE CHEMICAL PROFILES OF ESSENTIAL OIL OF NUTMEG FLESH (Myristica fragrans Houtt) THROUGH MULTIPLE DRYING METHODS	Sophia Grace Sipahelut, Ivonne Telussa	University of Pattimura
FET-14	STKSR-180	PHYSICHOCHEMICAL PROPERTIES OF FRESH SCAD (Decapterus sp) DURING SELLING AT TRADITIONAL MARKET MARDIKA IN AMBON	Imelda Krisanta Enda Savitri, Yanci Orindalim, R.B.D. Sormin, E. Lokollo	University of Pattimura
FET-15	STKSR-185	A Mini-Pilot Unit of Ice-Producer by Utilizing Refrigeration System for Coastal Fishermen	Rikhardus Ufie, Johnner Sitompul	University of Pattimura
FET-16	STKSR-186	Growth and carrageenan content of Red Algae, Kappahycus alvarezii (Doty) Doty different varieties farming using different methods and different habitats in Bolok Waters, Kupang Regency	Wilson L. Tisera, Rockie R.L. Supit, Alfred G.O. Kase, Lienda A. Handojo	Artha Wacana Christian University

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
FET-17	STKSR-191	"Analysis of Quality Salt Traditional Using Modified Cooking Tools in The Tiberias Group, West Oesapa Village Kelapa Lima Kupang City."	Umbu P. L. Dawa, Mada Mariana Lakapu, Dewi Setyowati. Gadi, Yunialdi H. Teffu1, Martinus Yohanis Paulus Pati, Yuventus Bria, Dewanto Umbu Saga Anakaka, Donny Mercys Bessie,Alfred G.O.Kase, Sanggono Adisasmito	Artha Wacana Christian University
FET-18	STKSR-192	Characterization of Antioxidant Activities of Forest Honey Enriched Red Ginger Extract (Zingiber officinale var. Rubrum)	Mery Rambu B. Djoru, Gabriela E.Hetharia, I.D.A.R.R Adi, G.N. Neonufa, Arista M.Tamonob, Ronny Purwadi	Artha Wacana Christian University
FET-19	STKSR-193	Composition of Pigments in Brown Algae Collected from Bolok Marine Waters	Alfred G. O. Kase, Yohanes Merryanto, Wilson Tisera, Donny M. Bessie, Rockie R.L. Supit, Dionisius A. Samsop, Beatrix M. Rehatta, Cristiani Soi Meo, Umbu Paru LowuDawa, Ayub U.I. Meko, Lienda A. Handojo	Artha Wacana Christian University
FET-20	STKSR-194	"Analysis of Bacteria Caused Ice-Ice Disease in Seaweed Through Polyculture in Dengka Island, Rote Ndao Regency"	Donny M. Bessie, Wilson L. Tisera, Umbu P. L. Dawa, Alfred G. O. Kase, Vania R. Th. Tisera, Nina J. Lapinangga, Sanggono Adisasmito	Artha Wacana Christian University
FET-21	STKSR-204	Effects of Tongka Langit Banana Puree Concentrations On The Quality of Yoghurt	Lorina Sahetapy, Helen Tuhumury, Erynola M.	University of Pattimura
FET-22	STKSR-207	Effect of Vacuum Pressure on Drying of Durian Fruit (Durio zibethinus)	Farah Hafizhah, Lienda Aliwarga	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
FET-23	STKSR-208	The Effect of Edible Coating and Cold Storage on Shelf-Life of Mangosteen Fruits	Farah Nuranjani, Lienda Handojo	ITB

Topic 3: Bioprocess Engineering (BPE)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
BPE-01	STKSR-004	Influence of Axenic Culture of Bacillus clausii and Mixed Culture on Biofilm Formation, Carbon Steel Corrosion, and Methyl Ester Degradation in B30 Storage Tank System	Christian Aslan, Nadia Ijkri Aulia, Hary Devianto, and **Ardiyan Harimawan**	ITB
BPE-02	STKSR-008	The Influence of Culture Types of Isolation Result on Biofilm Formation and Biocorrosion of ST-37 Carbon Steel in B30 Fuel Tank	Nadia Ijkri Aulia, Christian Aslan, **Ardiyan Harimawan**, and Hary Devianto	ITB
BPE-03	STKSR-022	Antibacterial Activity of Copper Nanoparticles (CuNPs) by Chemical Reduction Method	Rosi Wulandari, **Yuni Kusumastuti**, Agus Prasetya, Yekti Asih , and Himawan Tri B.M.P, and Arifudin Idrus	UGM
BPE-04	STKSR-023	Preliminary Study of Biological Route of Vanilin Production from Palm Oil Empty Fruit Bunch (EFB) Delignification Liquor	Syahdan A. Muhammad, **MTAP Kresnowati**	ITB
BPE-05	STKSR-036	Evaluation of Sequencing Batch Reactor Performance in treating Palm Oil Mill Effluent (POME) using Aerobic Granular Sludge	Regita Dewi Cahyani, Andri Sanjaya, Lisendra Marbelia, Mohammad Fahrurrozi, Johan Syafri Mahathir Ahmad, **Wiratni Budhijanto**	UGM

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
BPE-06	STKSR-038	A Review on Bioconversion of Lignin	Adelina Manurung, Syahdan A. Muhammad, **MTAP Kresnowati**	ITB
BPE-07	STKSR-070	Potential Utilization of Lignin from Biomass Waste	Adelina Manurung, Syahdan A. Muhammad, Ronny Purwadi, **MTAP Kresnowati**	ITB
BPE-08	STKSR-078	Isolation and Screening of Actinomycetes Active Against Plant Pathogenic Fungi	**Rofiq Sunaryanto**, Yusriani Sapta Dewi, Nurhayati, Johnner Sitompul	Satya Negara Indonesia University
BPE-09	STKSR-196	Phycocyanin Production from Spirulina platensis Grown in a Hybrid Photobioreactor System in Response to Varied Irradiance and Carbon dioxide Feeding	**Geraldi Rahanra**, Awalina Satya, Ika Atman Satya, Tjandra Chrismadha, Nofdianto Nofdianto, Gunawan Gunawan, Azalea Dyah Maysarah Satya, Ratih Pangestuti, Ardiyan Harimawan, Tjandra Setiadi	ITB

Topic 4: Chemurgy and Bio-based Materials (CBM)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
CBM-01	STKSR-001	Modification of hydrochar from biomass waste with thiourea to produce N, S rich-activated carbon for supercapacitor applications	H Rustamaji, **T Prakoso,** H Devianto, P Widiatmoko, W H Saputera	ITB
CBM-02	STKSR-002	Hydrothermal carbonization of de-ashed seaweed in the presence of a deep eutectic solvent for producing crude biochemical and activated carbon material	A I Putria, H Rustamaji, **T Prakoso**, J Rizkiana, H Devianto, P Widiatmoko, G Guan	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
CBM-03	STKSR-012	Rice Straw of Indonesia: Perspective through Monte Carlo Simulations	**Mekro Permana Pinem**, Yusvardi Yusuf, Dhimas Satria, Shofiatul Ula, Dwiananto Sukamto, Agung Sudrajat, Kurniawan Putra Yudha	Sultan Ageng Tirtayasa University
CBM-04	STKSR-015	Chitosan-Polyvinyl Alcohol (PVA) Based Composite Biofilm: The Effect of Solvents and Nanofillers	**Bintang Junita Siom**, Jayanudin, Mekro Permana Pinem, Endarto Yudo Wardhono	Sultan Ageng Tirtayasa University
CBM-05	STKSR-018	Glucose Oxidation into Formic Acid with Copper-based Catalyst	Virdi Chaerusani, Aghietyas Choirun Az Zahra, Tatang Hernas Soerawidjaja, Guoqing Guan, **Jenny Rizkiana**	Hirosaki University
CBM-06	STKSR-019	Analysis and Characterization of Microcrystalline Cellulose Synthesized from Microwave-Assisted Hydrolysis of Sugarcane Bagasse	A S R B Latifa, **W B Sediawan**, M Fahrurrozi	UGM
CBM-07	STKSR-021	Synthesis of Activated Carbon from Bamboo Biomass with Variations in Electrolyte Types	F R Titani, **T Prakoso**, H Devianto, P Widiatmoko, and H Rustamaji,	ITB
CBM-08	STKSR-030	Synthesis and Characterization of Nitrogen-Doped Carbon Materials from Rice Straw as Anode for Lithium-Ion Batteries	Novema Glendika Putri, Haris Ade Kurniawan, **Tika Paramitha**	Sebelas Maret University
CBM-09	STKSR-035	Purification of Crude Glycerol from Biodiesel by-product by Combined Acidification Method	Bambang Irawan	PT Badak NGL
CBM-10	STKSR-039	Recent advances of biomass-derived bifunctional oxygen electrocatalyst for air electrode	**Pramahadi Febriyanto**, Tirto Prakoso, Hary Devianto, and Pramujo Widiatmoko	ITB
CBM-11	STKSR-047	Overview of torrefaction technology for upgrading palm oil solid waste to energy biochar	Asri Gani, **Erdiwansyah,** Edi Munawar, Muhammad Faisal, Mahidin, Muhammad Zakia and Husni Husina	Syiah Kuala University

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
CBM-12	STKSR-093	Organic Solvents Effect on Spent Coffee Ground Oil Characteristics and its Biodiesel Production and Quality	**Tirto Prakoso,** Meiti Pratiwi, Calvin Niwarlangga, Stephen Andrean, Gladys Tiffany Jaya	ITB
CBM-13	STKSR-096	Synthesis and Thermal Stabilizing Effect on Polyvinyl Chloride of Calcium/Zinc Carboxylate from Palm Fatty Acid Distillate: Effect of Metal to Acid Ratio	**I Dewa Gede Arsa Putrawan,** Nadya Amalia Pratiwi Nento, Adli Azharuddin, Antonius Indarto, Dendy Adityawarman	ITB
CBM-14	STKSR-100	Biodegradable Foam Production Process Based on Extracted Cellulose of Empty Palm Oil Fruit Bunch and Chitosan for Food Packaging	Ihza Aulia Alfarisi, Havid Arga Kusumamurti, Fuad Dimar Fauzi, Yunita Aprilia, Muhammad Luqman Qodarusman, **Sunu Herwi Pranolo**	Sebelas Maret University
CBM-15	STKSR-107	Utilization of Tamarind Seeds Extract as a Natural and Sustainable Fabric Dye	Muhammad Arifa, Muhammad Ilham Azzindia, Meiti Pratiwi, Sanggono Adisasmito, Nuning Yanti Damayanti, Agus Tendi Ahmad Bustomi, **Jenny Rizkiana**	ITB
CBM-16	STKSR-110	Implementation of MASARO Technology for Compostable Waste Processing at Institut Teknologi Bandung – Jatinangor Campus	**Akhmad Zainal Abidin,** Hafis Pratama Rendra Graha, Elsye Veradika Yemensia, Hadi Mulya Anzhari, Muhamad Ihsan Maulana	ITB
CBM-17	STKSR-116	Biomimetic Delignification of Empty Fruit Bunches from Palm Trees	Nur Rohmah**, Tirto Prakoso,** Tatang Hernas Soerawidjaja	ITB
CBM-18	STKSR-181	ANTIBACTERIAL MECHANISM OF ETHYL ACETATE EXTRACT OF Jatropha curcas LEAVES AGAINST SOME HISTAMINE FORMING BACTERIA	**Beni Setha,** Imelda Krisanta Enda Savitri	Pattimura University

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
CBM-19	STKSR-187	Adding Adhesive On Making Of Waste Bricket Of Eucalyptus Oil Refining	**Arlindo U.S. Kette,** Jimmy J.S. Dethan, Fredrik J. Haba Bunga, Marthen Makaborang, Marten L. Lano, Nikodemus P.P.E. Nainiti, Jonathan E. Koehuan, Arista M. Tamonob, Nohyanto Banfatin, Ronny Purwadi	Artha Wacana Christian University
CBM-20	STKSR-195	Investigation of Process Variable Effects in Palm Kernelamydopropyl Betaine Production	**Astri Nur Istyami,** Meiti Pratiwi, Ronny Purwadi, Dianika Lestari, Amanda Nazwa Nur Fatihah	ITB
CBM-21	STKSR-199	Characteristics of Kesambi Leaf Torrefaction Biomass	**Jemmy J. S. Dethan**	Artha Wacana Christian University
CBM-22	STKSR-132	Synthesis of hydrochar from empty fruit bunches (EFB) and oil palm trunks (OPT) via wet torrefaction: A parametric study	Frederick Jit Fook Phang, Megan Soh**, Jiuan Jing Chew,** Aqsha Aqsha, Deni Shidqi Khaerudini, Gerald Ensang Timuda, Bing Shen How, Soh Kheang Loh, Suzana Yusup, Jaka Sunarso	Swinburne University of Technology
CBM-23	STKSR-113	Lignocellulosic Biomass Fractionation Through Bipashic-Solvent System	Carolus Borromeous Rasrendra, Ronny Purwadi, Christian, Harry James Cho, **Haryo Pandu Winoto**	ITB

Topic 5: Advanced Science and Materials (ASM)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
ASM-01	STKSR-003	Ionic Liquid-based Electrolyte in Supercapacitors	**Megawati Zunita**, Viona Aulia Rahmi	ITB
TOPIC CODE	**PAPER CODE**	**PAPER TITLE**	**AUTHOR**	**INSTITUTION**

ASM-02	STKSR-020	Optimization of Banten Ilmenite Leaching using Hydrochloric Acid	Venisa Mega Puteri Anggraenia, **Chandra Wahyu Purnomo**, Himawan Bayu Tri Murti Petrus	UGM
ASM-03	STKSR-024	Green Recovery of Nickel Element from Spent Catalyst for Lithium Nickel Manganese Cobalt Oxide (NMC)	**Endah Retno Dyartanti**, Tika Paramitha, Arif Jumari, Agus Purwanto, Adrian Nur, Anatta Wahyu Budiman, Shofirul Sholikhatun Nisa	Sebelas Maret University
ASM-04	STKSR-028	The Characterization and Electrochemical Properties of Copper-Complex	Kariana Kusuma Dewi, Ni Luh Wulan Septiani, Muhammad Iqbal, Nugraha, **Brian Yuliarto**	ITB
ASM-05	STKSR-033	Performance Study On An Intermediate Temperature Solid Oxide Fuel Cell Using Novel Composite Electrolyte	Aiman Mochammad Iqbal, Pramujo Widiatmoko, **Hary Devianto**	ITB
ASM-06	STKSR-045	Influence of Ceria-Doping on Anode Impedance	Daniel Benedict Iskandar, Darwin, Pramujo Widiatmoko, **Hary Devianto**	ITB
ASM-07	STKSR-055	Hierarchical Micro-Meso-Macroporous ZSM-5 Synthesized at Low Temperature	St Mardiana, Noerma J. Azhari, **Grandprix T.M. Kadja**	ITB
ASM-08	STKSR-057	Fabrication and Performance of Nickel-Cobalt Hydrogen Phosphate-Based Supercapacitor	Wulan Kusuma Wardani, Ni Luh Wulan Septiani, Muhammad Iqbal, Nugraha, **Brian Yuliarto**	ITB
ASM-09	STKSR-059	Synthesis of Hierarchical Nanorod ZSM-48 Zeolite Accelerated by Hydroxyl Radical Ion	Noerma Juli Azhari, Grandprix T. M. Kadja, St Mardiana, Munawar Khalil, Subagjo, M. H. Mahyuddin	ITB
ASM-10	STKSR-061	Preliminary Studies of ZIF-8 as Sensing Material for Electrochemical Detection of Dopamine	Nurul Hanifahad, Ni Luh Wulan Septiani, Nugraha, Brian Yuliarto	ITB
TOPIC CODE	**PAPER CODE**	**PAPER TITLE**	**AUTHOR**	**INSTITUTION**

ASM-11	STKSR-066	Preliminary Design Precipitated Calcium Carbonate from Blast Furnace Gas and Steel Slag Plant	Kusdianto, Arthanta Cracian, Umar Said, Suci Madhania, Siti Machmudah, Sugeng Winardi	ITS
ASM-12	STKSR-083	Alkali-Fusion Hydrothermal Synthesis of Zeolite X from Coal Fly Ash	Winny Wulandari, Jihan C. Nabila, Habibah Triannisa, Rahmaditha Murida, Jenny Rizkiana, Dwiwahju Sasongko	ITB
ASM-13	STKSR-084	Dynamic of Microemulsion Nanoparticle Precipititation : Sensitivity Analysis Of Particle Nucleation and Growth Order	Dendy Adityawarman	ITB
ASM-14	STKSR-089	Solar-Driven Water Purification for Sustainable Clean Water Supply	Heru Setyawan, Ni Made Intan Putri Suari, W. Widiyastuti, Tantular Nurtono	ITS
ASM-15	STKSR-101	Electrospinning Process for Polyacrylonitrile (PAN) Nanofibers: The Parameters Optimization	Siti Oryza Sativa, Muhammad Ali Zulfikar	ITB
ASM-16	STKSR-102	Computational Design of Molecularly Imprinted Polymer Material Used in Analysis of Polycyclic Aromatic Hydrocarbons	Aria Pinandita, Muhammad Ali Zulfikar, Muhammad Bachri Amran	ITB
ASM-17	STKSR-104	Identifying Microplastic Particle in The Drinking Water and Its Saurce Using FTIR Method	Akhmad Zainal Abidin, EV Yemensia, H M Anshari	ITB
ASM-18	STKSR-108	Study of Life Cycle Assessment of PVC Products in Indonesia	Ernie S A Soekotjo, Andro Alfiandi, Elsye Veradika Yemensia, Akhmad Zainal Abidin	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
ASM-19	STKSR-117	Fabrication of Scaffold Hydroxyapatite Using Natural Template, and Its Applications as Bone Implant: A Review	Reno Susanto, Tjokorde Walmiki Samadhi, Winny Wulandari	ITB
ASM-20	STKSR-123	On the Influence of Silica Nanoparticles to the Wettability Alteration of Sandstone	Sarah Dampang, Muhammad Mufti Azis, Ahmad Tawfiequrrahman Yuliansyah, Suryo Purwono	UGM
ASM-21	STKSR-161	Commercialization Evaluation of TiO2 Photocatalyst Durability and Performance for Oil Spill Remediation	Ahmad Ilham Zhafran, Rizma Halimatusadia	ITB
ASM-22	STKSR-169	Antibacterial Properties of Graphene-based Nanomaterials and Graphene-based Nanocomposites: A Mini Review	Vita Wonoputri, Hans Vito Xavier Khosasih, Robby Lysander Aurelio	ITB
ASM-23	STKSR-170	Home Laboratory Synthesis of ZnO Nanoparticles	Tjokorde Walmiki Samadhi, Vita Wonoputri, Jevan, Odara Eka Aptari	ITB
ASM-24	STKSR-183	Factors Affecting Stable Colloidal Zinc Oxide from Zinc Acetate	Prof. Dr. Sugeng Winardi, M.Eng., Nurdiana Ratna Puri, Indah Riwayati, Lailatul Qomariyah, Kusdianto	ITS
ASM-25	STKSR-198	Determination of Corrosion & Mitigation On Stainless Steel 22 cr & 314 Using Weight Thickness Method In Production In a Corrosion Environment	Yusuf Revy Fadillah, Agus Prama	Pertamina University

Topic 6: Separation Technology (ST)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
ST-01	STKSR-006	Study on microfiltration of crude biodiesel using ceramic membrane	**Samuel P. Kusumocahyo**, Natasya Z. Az'zura, Silvya Yusri, Hery Sutanto, Meliyanti, Eneng Maryani, Hernawan	Swiss German University
ST-02	STKSR-007	Polyethylene terephthalate ultrafiltration membrane for separation and purification process of coffee pulp extract solution	**Samuel P. Kusumocahyo**	Swiss German University
ST-03	STKSR-010	Graphene- Based Material for CO2/CH4 Separation	**Megawati Zunita**, Mulyana	ITB
ST-04	STKSR-025	Techno-economic analysis of coal leaching processes to produce ultra clean coal	**Abdul Rahman Marwis Karim**, Indah Nurani, Tiva Putri Tri Lestari, Joko Wintoko, Muhammad Mufti Azis	UGM
ST-05	STKSR-044	Preparation and Characterization of the Improved-Hydrophylic Polyvinylidene Fluoride (PVDF) Membrane Modified by Polymer Blending Technique	Muhfadzallah, **Umi Fathanah**, Sri Aprilia, Syawaliah Muchtar, Mukramah Yusuf	Syiah Kuala University
ST-06	STKSR-068	Optimizing ultrasonic-assisted extraction parameters to extract the antioxidant activity components in Vernonia amygdalina Del. Leaves	Buanasari, Danu Ariono, **Johnner P. Sitompul**	ITB
ST-07	STKSR-069	Removal of Acrylic Acid Containing Industrial Wastewater by Coagulation, Flocculation and Adsorption in a Mini Pilot Scale	Tifari Athia Zahra, **Johnner Sitompul**, Jonathan Sangwha Lee, Yusriani Sapta Dewi	ITB
ST-08	STKSR-075	Kinetics and Isotherm Adsorption Models of Acid Mine Drainage Heavy Metal Using Modified Clay	**Dr. Ir. Elvi Restiawaty**, Wibawa Hendra Saputera, Qiston Naufal Javiria, Elicia Kusuma	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
ST-09	STKSR-080	Determination of the Mobile Phase in Low-pressure Column Chromatography Using Thin-layer Chromatography to Purify Astaxanthin	Putri Restu Dewati, Rochmadi, Abdul Rohman, **Arief Budiman**	UGM
ST-10	STKSR-088	Challenges and Opportunities for Proton Exchange Membranes Development for Electrochemical Devices in Indonesia	**Hafis Pratama Rendra Graha**, Maisya Dina Putri Yanti, Tarisa Wulandari Putri, Zakaria Maulana	ITB
ST-11	STKSR-091	Organic Fouling Mechanism in Ultrafiltration Membrane	**Anita Kusuma Wardani**	ITB
ST-12	STKSR-097	Evaluation of Osmotic Pressured Membran Performance in Achieving Water Sustainability	Jeremiah Tjandra, Natasya Angelina, **Danu Ariono, Graecia Lugito**	ITB
ST-13	STKSR-099	Techno-Economic Analysis of Caustic Soda Production in Indonesia Based on Membrane Technology	**Rendra Panca Anugraha,** Juwaria, Renanto, Sahara Putri Fachrudy, Yuliana Erika Daoed	ITS
ST-14	STKSR-106	Precipitation of Potassium Chloride Salt from Salt Mixture Containing Sodium Chloride Using Water-Alcohol Solvents	Wibawa Hendra Saputera, Herri Susanto, Jonathan Maximilian Surya Atmaja, Amarthya Benigna Achmad	ITB
ST-15	STKSR-111	Water-Energy Nexus in Seawater Desalination System: Case of Integrated Osmotic Membranes	**Graecia Lugito,** Danu Ariono	ITB
ST-16	STKSR-150	Kinetics and Isotherm Adsorption Models of Acid Mine Drainage Heavy Metal Using Modified Clay	**Elvi Restiawaty**, Wibawa Hendra Saputera, Qiston Naufal Javiria, Elicia Kusuma	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
ST-17	STKSR-131	Adsorption Kinetics of Amoxicillin, Ampicillin, and Doripenem on Organobentonite	Jason Yi Juang Yeo, Aqsha Aqsha, **Suryadi Ismadji**, **Jaka Sunarso**	Swinburne University of Technology

Topic 7: Process Simulation (PS)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
PS-01	STKSR-037	Performance Evaluation of Solid Oxide Fuel Cell (SOFC) Integration Combination with Water Heater Gas For Waste Heat Recovery	Muhammad Nurfauzi Rizal, Pramujo Widiatmoko, **Hary Devianto**	ITB
PS-02	STKSR-040	Simulation on impact of humidity and carbon dioxide content in ambient air to zinc-air battery discharge profile	**Pramahadi Febriyanto**, Tirto Prakoso, Hary Devianto, Pramujo Widiatmoko	ITB
PS-03	STKSR-051	Comparing Options of BECCS in Indonesia Using Energy System Modelling	**Anggit Raksajati**, Attaya Artemis M, Zefania Praventia Sutrisno	ITB
PS-04	STKSR-053	Captured three-dimensional digital turbulent behaviors inside cyclones using computational fluid dynamics (CFD) design method	Soen Steven, Imam Mardhatillah Fajri, Elvi Restiawaty, **Yazid Bindar**	ITB
PS-05	STKSR-054	Improved operational unit process performance through three-dimensional design modifications using the computational fluid dynamics method	Soen Steven, **Yazid Bindar**, Imam Mardhatillah Fajri, Pasymi Pasymi, Elvi Restiawaty	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
PS-06	STKSR-065	Modeling and Simulation of Catalytic Conversion of Empty Fruit Bunch (EFB) into Polylactic Acid	Tifari Athia Zahra, Vika Fujiyama, Rihardhika Pramudya, Yoshi Eka Miryano, Muchammad Adriyan, Hyung Woo Lee, **Johnner Sitompul**	ITB
PS-07	STKSR-076	Modelling and Simulation of Coal Biosolubilization Kinetics	**Dr. Ir. Elvi Restiawaty**, Ardiyan Harimawan, Ignatio Senoaji Jagad Mitro Prajasto, Kevin Susiilo, Dwiwahju Sasongko	ITB
PS-08	STKSR-082	Simplified Simulation of Glucose Hydrolysis to Levulinic Acid for Estimating Kinetic Parameters	Meutia Ermina Toif (**Arief Budiman**), Saviri Kamila Fatma, Muslikhin Hidayat, Rochmadi	UGM
PS-09	STKSR-085	Simulation of Photocatalytic Degradation of Methylene Blue using Titanium Dioxide (TiO2) P25 as a Photocatalyst	**Wibawa Hendra Saputera**, Awanis Mazayasina, Nitya YatashaDewi, Pramujo Widiatmoko, Dwiwahju Sasongko	ITB
PS-10	STKSR-086	Simulation of Photocatalytic Degradation of Phenol using TiO2 P25-based Photocatalyst	**Wibawa Hendra Saputera**, Reynaldo Jonathan, Jeffry Jaya Pranata, Pramujo Widiatmoko, Dwiwahju Sasongko	ITB
PS-11	STKSR-095	Heat Transfer Coefficient on Stirring Palm Fatty Acid Distillate in a Jacketed Tank at a Dynamic Stage	**I Dewa Gede Arsa Putrawan**, Yona Octavia, Antonius Indarto, Dendy Adityawarman	ITB
PS-12	STKSR-109	Process Analysis of the Multi-Chemical Green Production from Seawater and Air with Renewable Energy	**Anton Irawan**, Teguh Kurniawan, Hafid Alwan, Widya Ernawati, Heri Heriyanto, I Dewa Gede Arsa Putrawan, Elvi Restiawaty, Soen Steven, Yazid Bindar	Sultan Ageng Tirtayasa University
PS-13	STKSR-129	Simulation Study on the Effect of Temperature on the Commercial Polypropylene Production Process	**Tri Partono Adhi**, Dodi Afandi	ITB

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
PS-14	STKSR-130	Analysis on the Performance of A Commercial Acid Gas Removal Unit	**Tri Partono Adhi**, Sekar Ekawati Parasiwi	ITB
PS-15	STKSR-201	Analysis of Water Injection Network using Aspen Hysys Hydraulic	Migel Aldila, **Tri Partono Adhi**	ITB
PS-16	STKSR-133	Evaluation of Dew Point Control Unit for an Offshore Production Facilities	**Tri Partono Adhi**, R. Widyapradhana Dhanarjaya	ITB
PS-17	STKSR-027	Hydrodynamic Studies of Two-Phase Liquid-Liquid Slug Flow In Circular Microchannel with T-junction	**Dr. Aloisiyus Yuli Widianto, S.T., M.Sc** ; Caroline Elfa; Reynaldo Valentino	University of Surabaya
PS-18	STKSR-184	Analysis Of Changes in Gas Turbine Compressor Operation at Gas Processing Station from Parallel to Series Using Aspen Hysys	Patria Suryatmaja, **Indar Kustiningsih**, Hafid Alwan, Yazid Bindar	Sultan Ageng Tirtayasa University
PS-19	STKSR-197	Techno-economic study of optimized multi-stage flash vaporization based condensate stabilization unit	**Tri Partono Adhi**, Hilman Ali Hazmi	ITB
PS-20	STKSR-202	Analysis of Control Management to the Public Transport Drivers Using Global Positioning System (GPS)	Muhammad Arief Munadi, **Meldasari Said,** Zainal Arifin	Sekolah Tinggi Ilmu Ekonomi Indonesia Banjarmasin
PS-21	STKSR-203	Analysis of Reservoir Complexity Index (RCI) Towards Value of Recovery Factor (RF) in Oil Field on Sandstone Reservoir with Chemical Surfactant Injection	**I Made Dalam Saputra Jagadita, Dedy Irawan**	ITB

Topic 8: Industrial Application (IA)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
IA-01	STKSR-016	Flow Assurance Study On Natural Gas Production Facility	**Babar Priyadi Mugi Hanggana**	ITB
IA-02	STKSR-058	Heavy Hydrocarbon Recovery from CO2-Containing Natural Gas for Gas Transmission Pipeline	F. Yusupandi, P. Widiatmoko, I. F. Sukmana, H R. Fitri, M. Eviani**, H. Devianto**	ITB
IA-03	STKSR-090	Thermodynamic Performance Correction of Single Shaft Gas Turbine Generator In Oil And Gas Production Field	**Rhobi Rozieanshah**	ITB
IA-04	STKSR-128	Simulation of Catalytic Coal Gasification for IGCC Process	Hans Adrian, Muhammad Ariqsyah Indra, Dwiwahyu Sasongko, **Jenny Rizkiana**	ITB
IA-05	STKSR-166	DETERMINATION OF THE EFFECT OF ELEVATION ON INTERNAL CORROSION AND MITIGATION IN CS PIPELINE USING OLGA SIMULATOR	Muhammad Ismi Afif, **Agus Pramana**	Pertamina University
IA-06	STKSR-205	The Effect of Essential Oil Derived Octane Booster Addition to Gasoline Product Quality	**Priambodo Purwo Handoyo**, Isnandhi Dwi Saputra	PT Kilang Pertamina Internasional
IA-07	STKSR-206	A Quantum Leap: Renewable Diesel Production Drop-in PT. Kilang Pertamina Internasional	**Sahkundiyar**	PT Kilang Pertamina Internasional
IA-08	STKSR-209	Enhancing Multiplier Effect of HVO Circular Economy: Indonesia Case Study	**Isnandhi Dwi Saputra**, **Wahyu Gunawan**	PT Kilang Pertamina Internasional

Topic 9: Reaction and Control Engineering (RCE)

TOPIC CODE	PAPER CODE	PAPER TITLE	AUTHOR	INSTITUTION
RCE-01	STKSR-029	Electrochemical Reduction of Carbon Dioxide into Formic Acid using Carbon-Based Electrode: Effect of Type of Reactor	N D Jayanti, P Widiatmoko, T Prakoso, M Eviani, **H Devianto**	ITB
RCE-02	STKSR-063	Carbon Capture and Storage to Simultaneous Biogas Purification and Precipitated Calcium Carbonate Production Using Ca(OH)2 Aqueous Solution in A Bubble Column Reactor	Suci Madhania, Muhammad Hubbal, Faris VIrgiansah, M. Fauzan Firdaus, Kusdianto, Siti Machmudah, **Sugeng Winardi**	ITS
RCE-03	STKSR-134	Dynamic Simulation of Operating Envelope of Haber-Bosch Ammonia Synthesis Process	**Avariz Muhammad**,Tri P. Adhi	ITB
RCE-04	STKSR-073	Catalytic Hydrogenolysis of Glycerol to Produce Monoalcohols	Eka M Idzati, **Firman Kurniawansyah**, Hikmatun Ni'mah, Mahfud, Tantular Nurtono, Achmad Roesyadi	ITS
RCE-05	STKSR-074	In-situ Catalytic Upgrading of Bio-Oil from Fast Pyrolysis of Lignin over High Aluminum Zeolites	Irwan Kurnia, Virdi Chaerusani, Abuliti Abudula, **Guoqing Guan**	Padjadjaran University
RCE-06	STKSR-098	Investigation of nickel-impregnated niobium oxide catalyst to improve the quality of low-grade LDPE pyrolysis oils composition via catalytic reforming	Fahrizal Nasution, **Husni Husin**, Mahidin, Faisal Abnisa, Syahrul Fahmi	Syiah Kuala University
RCE-07	STKSR-118	Initial approach of NbOPO4 ability to hydrodeoxygenation reaction of palm oil based on ATR-IR spectra alteration	Firda Tirta Yani, **Husni Husin**, Darmadi, Syaifullah Muhammad	Syiah Kuala University

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RCE-08	STKSR-121	Kinetic Studies on the Direct Synthesis of Dimethyl Ether (DME) Using a Mixture of Methanol Synthesis and Methanol Dehydration Catalyst	**Puji Andini**, Herri Susanto, and Aisyah Ardy	ITB
RCE-09	STKSR-122	Numerical solution of nth order DAEM for kinetic study of lignocellulosic biomass pyrolysis	Jonas Kristanto, **Muhammad Mufti Azis,** Suryo Purwono	UGM
RCE-10	STKSR-125	Study of Methanol and DME Process Production from Coal Gas Synthesis Results	**Fajar Reksaning Adhi**, Aisyah Ardy, Herri Susanto	ITB
RCE-11	STKSR-200	Performance Comparison of Process Configurations for Commonly Found Ammonia Reactor Synthesis Loops	Aditya Rinus Pratama Putra**, Tri Partono Adhi**	ITB
RCE-12	STKSR-178	"Kinetic Study of Methylene Blue on ZnO/Zeolite Synthesized from Red Mud under UV-LED Lamp Irradiation"	Hellna Tehubijuluw, Yuly Kusumawati, Didik Prasetyoko	Pattimura University

Topic 10: Chemical Engineering Education (CEE)

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CEE-01	STKSR-042	Conceptualization of Prototype Curricula with Project Based Learning for Chemical Engineering Major in Vocational High School	Christian Aslan, Ardiyan Harimawan, Dian Shofinita, Vita Wonoputri, Muhammad Helmi Risansyauqi, Agus Tendi Ahmad Bustomi, **Jenny Rizkiana**	ITB

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FET-03	STKSR-046	Life Cycle Assessment of Decaffeinated Coffee Beans Production	**Andreana Rochili**, Fiorine a	ITB
BAE-08	STKSR-056	Interaction of Biomass and Biochar of Seaweed and Apple Tree Branch in Two-Stage Co-gasification System	**Yohanes Andre Situmorang**, Guoqing Guan	ITB
RCE-02	STKSR-063	Carbon Capture and Storage to Simultaneous Biogas Purification and Precipitated Calcium Carbonate Production Using Ca(OH)2 Aqueous Solution in A Bubble Column Reactor	Suci Madhania, Muhammad Hubbal, Faris VIrgiansah, M. Fauzan Firdaus, Kusdianto, Siti Machmudah, **Sugeng Winardi**	ITS
ASM-11	STKSR-066	Preliminary Design Precipitated Calcium Carbonate from Blast Furnace Gas and Steel Slag Plant	Kusdianto, Arthanta Cracian, Umar Said, Suci Madhania, Siti Machmudah, **Sugeng Winardi**	ITS