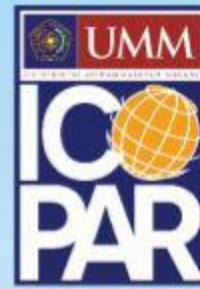




PROCEEDINGS OF THE 1<sup>ST</sup> UMM INTERNATIONAL  
CONFERENCE ON PURE AND APPLIED RESEARCH  
(UMM-ICOPAR 2015)



PROCEEDINGS OF THE 1<sup>ST</sup> UMM INTERNATIONAL CONFERENCE ON PURE AND APPLIED RESEARCH (UMM-ICOPAR 2015)



# PROCEEDINGS

THE 1<sup>ST</sup> UMM INTERNATIONAL CONFERENCE ON  
PURE AND APPLIED RESEARCH  
(UMM-ICOPAR 2015)

"PLANNING FOR ENVIRONMENTAL SUSTAINABILITY  
FOR THE WELL-BEING OF FUTURE HUMANITY"

AUGUST 21-22, 2015 | MALANG, INDONESIA



UNIVERSITY OF MUHAMMADIYAH MALANG

**WELCOME to ICoPAR-2015**

**Assalamu'alaikum Wr.Wb.**

I would like to express the bottom of my heart welcome to several parties. Especially those who come from partner countries to the University of Muhammadiyah Malang (UMM). My sincere gratitude firstly pass to the invited keynote speakers: the head of Indonesian Sciences Institute, Prof. Dr. Iskandar Zulkarnain, President of Asian Conference of Religion and Peace, Prof. Dr. Dien Syamsyuddin, Ambassador of Georgian for Indonesia, HE. Zurab Aleksidze, Visiting Professor Pusan University, Dr. Rio Hinata Yamaguchi and Lecturer of Singapore Polytechnic, Dr. Noel Kristian. Secondly, I also give my grateful appreciation to domestic speakers and all participants. Welcome to this campus, we do hope you can enjoy your stay at UMM. My deeply welcome also pass to all participants both domestic and foreign ones. I feel indeed proud of your visit to our university.

University of Muhammadiyah Malang was founded in 1965. Right now we have eleven faculties and 50 fields including graduate and post graduate degrees with approximately 25,000 students coming from all over part of Indonesia. We also have a number of international students who come from United State of America, Europe, Australia and Asian countries. In the last three decades UMM has been trying to take part in developing human resources nationally and internationally. This conference is one of our effort to develop human quality through the improving of environmental sustainability which contribute significantly to the quality of human being. The global warming which has been a very important issue in many international forums will become a very serious problem for the future of universe. Therefore, we should take part to have appropriate steps to find the way-outs. And I am really believe that this conference is one of the answers for the above problems.

I do hope all the participants will be able to share your new ideas, concepts and experience in this conference for better life in the future. May God bless us forever, good luck and thank you very much.

**Wassalamu'alaikum Wr.Wb.**

**Sincerelly Yours**

**Prof. Dr. Muhadjir Effendy, M.Ap.**

**Rector of University of Muhammadiyah Malang**

## **WELCOME to ICoPAR-2015**

**Dear Participants,**

**Assalamu'alaikum Wr.Wb.**

On behalf of Organizing Committee of 1<sup>st</sup> International Conference on Pure and Applied Research University Muhammadiyah Malang (UMM ICoPAR-2015), first of all, let us praise to Allah S.W.T the most Gracious and the most Merciful, Who always fulfilling blessing to us for better health and prosperity. I really would like to extend my warmest welcome to all speakers and participants at 1<sup>st</sup> International Conference on Pure and Applied Research University Muhammadiyah Malang, with the theme **“Planning for Environmental Sustainability for the Well Being of Future Humanity”**.

**As a Head of Directorate Research and Community Service, I am very proud to say that today,** The 1<sup>st</sup> UMM ICoPAR-2015 is an established academic forum for presentation and discussion of interdisciplinary scholarships on pure and applied sciences. The conference has numbers academic field tracks, which accept full research papers in relation with the big theme of UMM Research. This conference provide an environmental for promoting and bridging connection and collaboration of research and scholarly discussions in the area of pure and applied science. **Directorate Research and Community Services** has five big themes namely Environmental sustainability and Energy, and Food, and Health, and Social & Humanity also and Education & Psychology.

This conference is expected to fruitful a lot of new ideas and concepts in relation with those big theme as the steps for realizing how to have the way-outs. Therefore the conference accepts paper as the result of research both pure and applied. Finally, I am really warm to say that you all are able to enjoy all deeply discussion and have a better academic communication for developing science and knowledge. Thank you very much and enjoy this conference at University of Muhammadiyah Malang.

**Wassalamu'alaikum Wr.Wb.**

**Best Regard,**

**Prof. Dr. Sudjono, M.Kes.**

**Head of Directorate Research and Community Service**

## **WELCOME to ICoPAR-2015**

**Dear Participants,**

**Assalamu'alaikum Wr.Wb.**

It is my great pleasure to welcome you to the 1<sup>st</sup> International Conference on Pure and Applied Research University Muhammadiyah Malang (UMM ICoPAR-2015), East Java, Indonesia. This event is organized by the Lecturers of University of Muhammadiyah Malang (UMM) and supported by many sponsorship namely Indosat, BNI and Bank of Jatim (East Java Bank), UMM Press and many others. This conference is conducted for providing academics to present their research as well as publishing. It is also to actualize the big theme of UMM Research.

The 1<sup>st</sup> UMM ICoPAR-2015 is an established academic forum for presentation and discussion of interdisciplinary scholarships on pure and applied sciences. The conference has numbers academic field tracks, which accept full research papers in relation with the big theme of UMM Research. This conference provide an environmental for promoting and bridging connection and collaboration of research and scholarly discussions in the area of pure and applied science. The conference has five themes namely Environmental sustainability and Energy, Food, Health, Social & Humanity and Education & Psychology. The conference also accepts work in progress as well as theses and dissertations in writing.

The 1<sup>st</sup> UMM ICoPAR-2015, committee has received 204 extended abstract submission from 12 countries. In the first review and selection, 99 titles were social science and 102 titles were exact science. The result, selected paper would be presented in the conference and published on International Journal (Journal Teknologi, Telkomnika, Agrivita for exact science and ; Edulearn, Advances in Social Science, Education and Humanities Research for social science).

Finally, let me wish you enjoyable the conference and have a good time and memories in Malang especially in Batu tourism City and the mount of Bromo.

**Wassalamu'alaikum Wr.Wb.**

Best Regard

**Dr. Vina Salviana D.S., MSi.**

Chairman of 1<sup>st</sup> UMM ICoPAR-2015

**MAP OF VENUE**



## SHORT BIO KEYNOTE AND INVITED SPEAKER



**Prof.Dr.Ir. Iskandar Zulkarnain** Head of Indonesian of Sciences (LIPI)

### **Prof. Dr. Ir. Iskandar Zulkarnain**

NIP : 195904141985031003  
Nama : Prof. Dr. Ir. Iskandar Zulkarnain  
Kartu Pegawai : C. 0754612  
Tempat, Tanggal Lahir : Cirebon, , 14-04-1959  
Jenis Kelamin : Laki-laki  
Status : Aktif  
Unit Kerja : Pusat Penelitian Geoteknologi  
Instansi : Lembaga Ilmu Pengetahuan Indonesia  
Bidang Kepakaran : 04.02 Geokimia  
Pendidikan terakhir : S3 Doktor Petrologi / Meneralogi  
Jabatan : 01-01-1970 Peneliti Utama-IV/e



**Prof. Dr. H. M. Din Syamsuddin**

**Prof. DR. M. Din Syamsuddin, MA.** He was born in Sumbawa Besar, August 31, 1958. He has married, his wife was Fira Beranata (entrepreneur and mother). He has three children, namely (1) Farazahdi Fidiansyah (male/ 19 years old, students at Prasetya Mulya Bussiness School), (2) Mihra Dildari (male/17 years old, Labs. Senior High School, Jakarta) and the third children was Fiardhi Farzanggi (male/15 years old, firstlevel class at International Islamic Boarding School, Cikarang. He has graduated his elementary (1968) and Yunior High School (1972) in Sumbawa Besar, then Senior High School at Pondok Modern Gontor, East Java (1975). He has graduated from IAIN Jakarta, as Bachelor at Ushuluddin (BA, 1080) and graduated Sarjana S1 in 1980 in the field of Religion Comparison. He graduated from University of California Los Angeles (UCLA), USA, Interdepartmental Programme in Islamic Studies (MA, 1988) then graduated his PhD in 1991. Now, he has been an lecturer in UIN Syarif Hidayatullah since 1982 as Guru Besar. He also has experiences as lecturer in many other Universities such as Muhammadiyah University of Jakarta, UHAMKA, University of Indonesia and the member of National research council as long as 5 years (1993-1998). Besides as lecturer, Prof Din Syamsudin has been active to be chairman at Islamic Organization especially Muhammadiyah since he was student in 1970 up to now, namely: The Chaiman of IPNU Cabang Sumbawa (1970 - 1972), The chairman of Student Senate, Ushuluddin Faculty IAIN Jakarta (1980-1982), The chairman of DPP Muhammadiyah Student Association (IMM, 1985), The General Chairman of Muhammadiyah Young-Man (1989-1993), Vice Chairman of Indonesian Young-Man Association (1990-1993), Secretary of Advice council ICMI (1990-1995), Vice Chairman of Central Leader of Muhammadiyah (2000-2005), General Secretary of Indonesia UlamaMajelis (MUI, 2000-2005). As an active lecturer, he was also active in many political organization such as the chairman of Research and development department of GOLKAR (1993-1998), Vice General Secretary of DPP GOLKAR (1998-2000), Vice Secretary of Karya Pembangunan MPR-RI (1998), Vice Chairman of Fraksi Karya Pembangunan MPR-RI (1999) and to be a Direktorat Jenderal of Worker Placement DEPNAKER (1998-2000). Recent Occupation, he is the General Leader of Central Leader Muhammadiyah (2005-2010), Vice Chairman of MUI (2005-2010), Vice Chairman of Advisory Council ICMI (2005-2010), The Chairman of Indonesian Committee on Religions for Peace / IComRP (since 2000), The Chairman of Center for Dialogue and Cooperation Among Civilizations/ CDCC (since 2007). His Positions in organization as Chairman, World Peace Forum/ WP, President, Asian Committee on Religions for Peace/ ACRP, based in Tokyo (since 2004), Honorary President, World Conference on Religions for Peace/ WCRP, based in New York (since 2006 ), Member, World Council of World Islamic Call Society, based in Tripoli ( since 2005), Vice Secretary General, World Islamic People's Leadership, based in Tripoli (since 2005), Member, Strategic Alliance Russia based Islamic World (since 2006), Member, UK-Indonesia Islamic advisory Group (since 2006).



**Zurab Aleksidze - Ambassador of Georgia to the Republic of Indonesia was born in Tbilisi, Georgia in 27 August 1970 Married with one son.**

### **Working experience**

In October 2012 Mr. Zurab Aleksidze was appointed as the Ambassador Extraordinary and Plenipotentiary to the Republic of Indonesia. In 2011 - 2012 in the Ministry of Foreign Affairs of Georgia he became the Director of the Department Asia, Africa, Australia and Pacific Rim. In 2007 - 2011 he served as the Minister Extraordinary and Plenipotentiary at the Embassy of Georgia to the Hellenic Republic and Croatia. In January 2006 - December 2006 at the Ministry of Foreign Affairs of Georgia he was the Director of the Department for Russia. In May 2005 - December 2005 at the Ministry of Foreign Affairs of Georgia Mr. Aleksidze was the Director of the Department for the Regional Cooperation (South Caucasus, Ukraine, CIS and Guam). In May 2002 - May 2005 he served as the Senior Counselor, Embassy of Georgia in the Republic of Italy and Permanent Representation to FAO, WFP, IFAD. In August 2000 - May 2002 at the Ministry of Foreign Affairs of Georgia he served as the Deputy Director of the second European Department. In May 1997 - August 2000 he was the Counselor at Embassy of Georgia to the Republic of Armenia. In 1992-1993 he was Scientist, faculty of oriental studies, Georgian and Armenian language and literature, Tbilisi State University.

### **Education**

In 2006 Mr. Zurab Aleksidze attended the Seminar of Government for Asian Countries organized by the Ministry of Commerce and Peking University of People's Republic of China. In 2001 he participated in the Seminar organized by the Netherlands Institute of International Relations 'Clingendael'. In 1993 - 1996 he received diploma from the Post graduate studies at the Pontifical institute of Oriental Studies, Rome. In 1992-1995 at the Academy of Science of Georgia, State Institute of Manuscripts, he attended the Post-graduate Studies. In 1987 - 1992 he graduated from Tbilisi State University, Faculty of oriental studies.





**He is a lecturer at Singapore Polytechnic. Since 2010 he has been as**Team leader for Overseas Social Innovation program named Learning Express in South East Asian countries namely Indonesia, Vietnam, Thailand, Malaysia, Philippines; Trainer for Certificate of Competency in Water Treatment; Trainer for Certificate of Competency in Sewage Water Treatment; Trainer in CDIO - "Designing Active and Experiential Learning Curriculum" Trainer in Design Thinking; Management committee in SP Innovating Engineering Education (IEE) Team; Management committee in Chevron Asia Pacific Chem-E-Car competition 2012. Teacher advisor for International Student Club in SP. From April 2005 to January 2006, He was a Management Trainee at Philip Morris International especially Trainee in the production line, product development and sales marketing of a tobacco company. He was also a Researcher Officer in Indonesia, about Developed a New Type of Catalyst for Biodiesel Production Palm Oil Waste. He has ability on many field such as Chemical Engineering, Matlab, Electrochemistry, Scanning Electron, Research, Process and Product. He has graduated from Nanyang Technology University on PhD of Chemical Engineering. He was graduated from Institut Teknologi Bandung (Bandung Technology Institute), as B.End, Chemical Engineering (2006-2009). He was many interest in such field : Teaching and Learning Pedagogy, Experiential Learning, Project Based Learning. If someone wants to contact him he said that *"I am available for consultancy and training in educational pedagogy especially on the topic of active and experiential learning, how to motivate students, design thinking for educators. On the technical side, I also provide consultancy and training in water treatment, waste water treatment and green engineering and technology"*. He also said for his relationship by E-mail *"I can be reached at noel.kristian@gmail.com"*. For his performance, he has many acknowledgement as:

- Plenary speaker in 2nd International Conference in Sustainable Innovation 2014.
- Plenary speaker in ASEAN Undergraduate Chemical Engineering Summit 2014.
- Invited article contributor for "The Chemical Engineers" magazine for April 2014 issue.
- Invited speaker in World Engineers Summit 2013.
- Invited speaker in 9th World Congress in Chemical Engineering 2013.
- Best Teaching Assistant in NTU for academic year 2008-2009 and academic year 2007-2008
- Best poster for the most popular graduate project in Discover Engineering NTU 2008
- Science Direct top 25 hottest articles in Electrochemistry Communication Journal in January-March 2008 and July-September 2008 by Elsevier publisher.



**Dr. Ryo Hinata-Yamaguchi** from Saku, Japan is a Visiting Professor at the Pusan National University, Department of Global Studies, and also an Adjunct Fellow at the Pacific Forum CSIS, and a Sergeant First Class in the Japan Ground Self-Defence Force (reserve). Ryo has presented and published a variety of papers on defense and security issues in the Asia-Pacific, and received his PhD from the University of New South Wales – Canberra with a dissertation on North Korea’s military capability management. Ryo is a former Korea Foundation Language Training Fellow, received his MA in Strategic and Defense Studies and BA in Security Analysis from the Australian National University. Ryo has previously held positions at the Universitas Muhammadiyah Malang, FM Bird Entertainment Agency, International Crisis Group Seoul Office, Sasakawa Peace Foundation, Embassy of Japan in Australia, and the Japan Foundation Sydney Language Centre. He has extensive international experience, having lived over 20 years in Australia, Korea, Malaysia, Singapore, Indonesia, and the US. Ryo is a native speaker of Japanese and English, is fluent in Korean, and also has some knowledge of Chinese and Malay.

Now, he is as Visiting Professor at Pusan National University. He has a lot of experience in teaching namely: Teaching six undergraduate courses: Security in East Asia; Technology in East Asia Regional Affairs; Korea: Politics and Foreign Policy; North Korea: Politics and Foreign Policy; International Relations in East Asia; and Japan: Politics and Foreign Policy. Student evaluations thus far between 4.56 and 4.85 (out of 5). In addition, I also give guest lectures, seminars and media appearances on security affairs in East Asia, leadership, and multiculturalism, as well as participating and leading various extra-curricular activities for students.

**LIST OF REVIEWERS**

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Novin Farid Stywo Wibowo, M.Si	University of Muhammadiyah Malang	Indonesia
Prof. Dr. Ahmad Martodla Mohammad	University Utara Malaysia	Malaysia
Assoc. Prof. Dr. Maizirwan Mel	International Islamic University	Malaysia
Prof. Suzuki, PhD. (Aichi Universty Nagoya)	Aichi University Nagoya	Japan
Roy Hendroko	Agronomy Bioengineering-Research Gate	Indonesia

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Malang, 10 November 2014

***For the Rector,  
Vice Rector I***

***Prof. Dr. Bambang Widagdo, MM.***

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## Combustion characteristic of *Albizia falcataria* using thermogravimetry

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### Abstract

In this paper, combustion characteristic of *Albania falcataria* was investigated. The sample was sieved until passes 100 mesh and heated in air with heating rate 80 °C/min to 900 °C. three kinds of initial mass performed on this research that were 10 mg, 15 mg and 20 mg. Thermogravimetic (TG) analysis was used to study and compare the combustion among of initial masses. TG curves are in correspondence with the volatiles of the material studied. Non-Isothermal thermogravimetric data were used to access the kinetics of combustion of material. The results of TG analysis have shown that thermal decomposition of the initial mass 15 mg takes place at higher enthalpy as compared to the others initial mass samples because of the AFR effects of the chemicals in the samples

Keywords : Combustion; Thermogravimetric; *Albania falcataria* ; initial mass; enthalpy

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## 1. Introduction

Biomass is a renewable energy source that refers to biological material derived from recently dead organisms. The sources of biomass fuel are wood sawdust, municipal solid waste and agricultural waste. Wood is the most widely used source for biomass. One highly productive tree is Sengon (*Albania falcataria*). The use of biomass fuels provides substantial benefits as far as the environment is concerned. Biomass absorbs carbon dioxide during growth, and emits it during combustion. Therefore, biomass helps the atmospheric carbon dioxide recycling and does not contribute to the greenhouse effect. Biomass consumes the same amount of CO from the atmosphere during growth as is released during combustion.[1]

### Nomenclature

$dQ/dt$  Heat flow

$dH/dt$  enthalpy change

$dT$  further nomenclature continues down the page inside the text box

## 2. Material and Methods

### 2.1. Material

Sawdust of *Albazia Falcataria* was collected from local sawmill business in Lumajang Regency, East Java Provincial, Indonesia. *Albazia Falcataria* was be planted because many demand on this product, beside that it has short life to felled. The samples was sieved until pass 100 mesh before take placed in  $Al_2O_3$  crucible pan.

### 2.2. Methods

Investigation using DSC-TGA Linseis was held in Central Laboratorium, Physics Department, Mathematics and Natural Sciences Faculty, State University of Malang. Sawdust of *Albania falcataria* was sieved until pass 100 mesh. Analysis of biomass sample was heated in airflow rate 5 liter/ min with heating rate 80 °C/min to 900 °C and held for 10 min to constant weight [2]. 10 mg, 15mg and 20 mg samples were spread uniformly on the bottom of the crucible made of alumina. Thermogravimetric analysis was performed using The LINSEIS STA Platinum Series ( Simultaneous Thermal Analysis ).

## 3. Result and Discussion

The result of 10 mg, 15 mg and 20 mg combustion experiment were plot in fig 1, 2 and 3 respectively

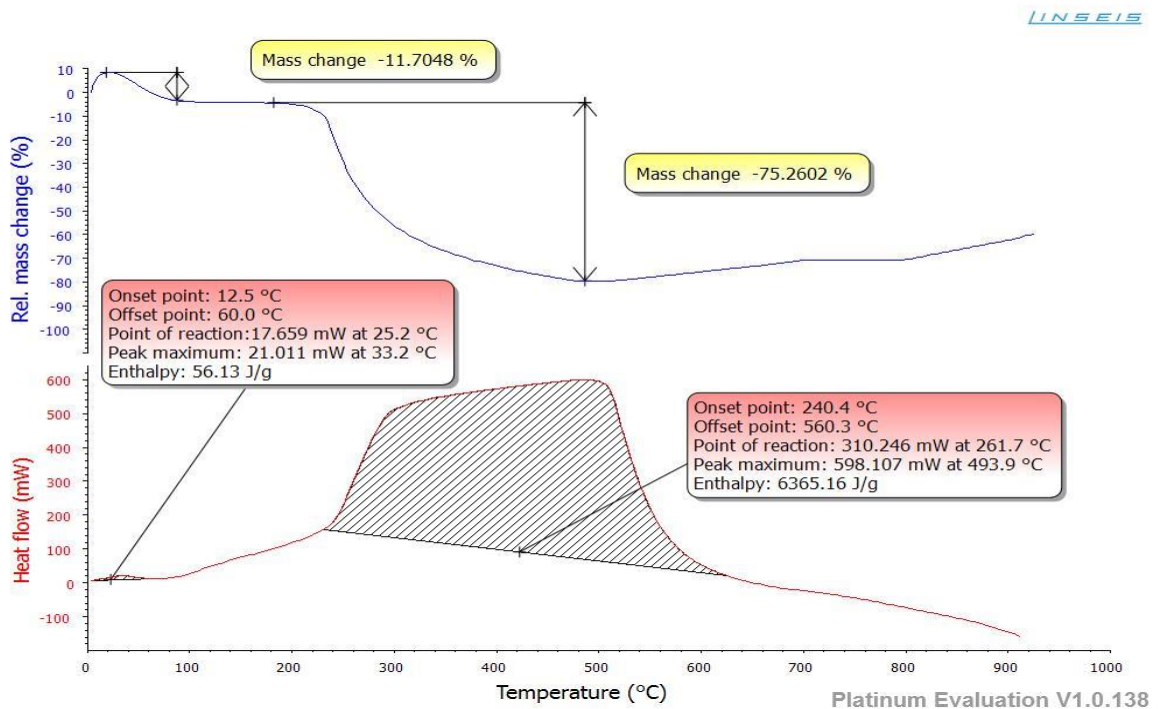


Fig.1. Combustion characteristic 10 mg

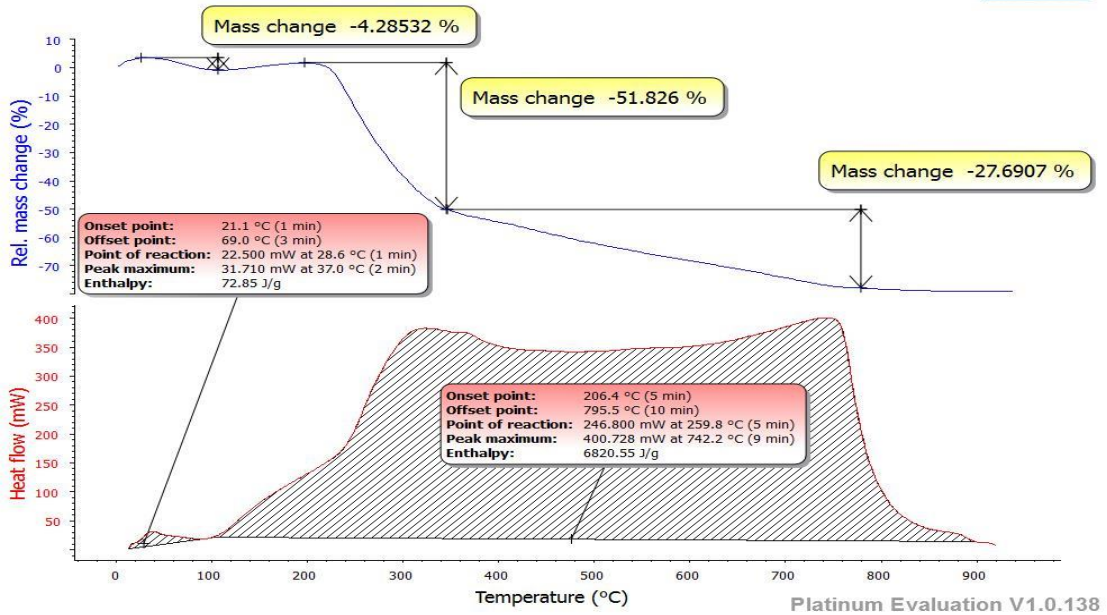


Fig.2. Combustion characteristic 15 mg

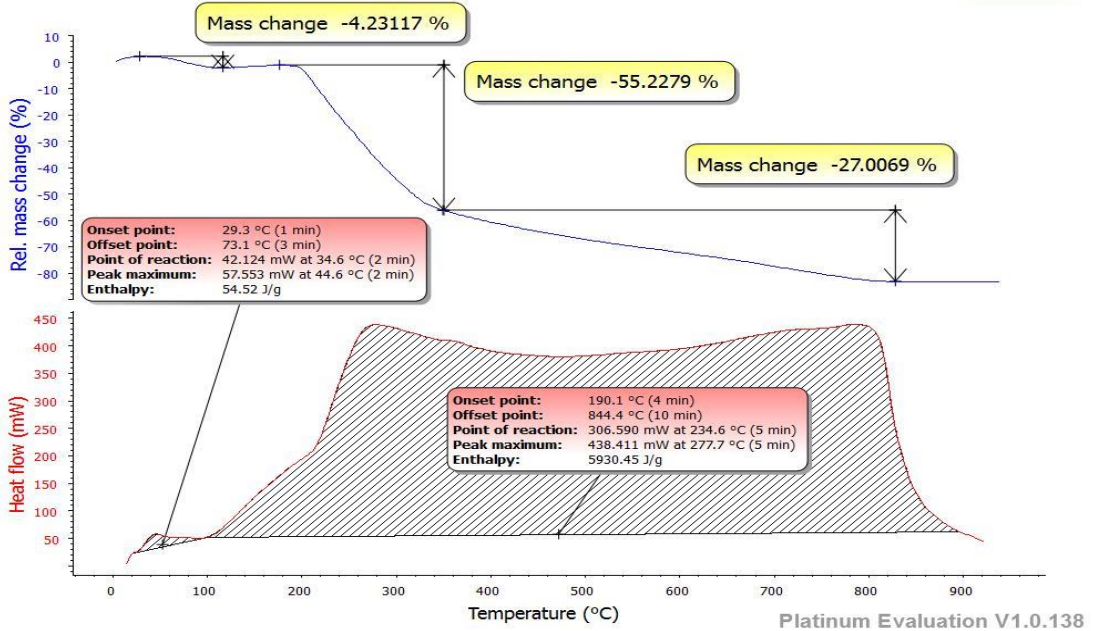


Fig.3. Combustion characteristic 20 mg



It shows that 15 mg sample has the higher enthalpy among the others. It caused probably Air Fuel Ratio combination in the setting of Simultaneous Thermal Analysis. The heat flow and air flow for the other initial mass maybe different than 15 mg. Since the DSC is at constant pressure, heatflow is equivalent to enthalpy changes

$$\left(\frac{dQ}{dT}\right) = \left(\frac{dH}{dT}\right)$$

Hence  $dH/dt$  is the heatflow measured in mcal/sec. The heatflow difference between the sample and the reference is :

$$\Delta \frac{dH}{dt} = \left(\frac{dH}{dt}\right)_{sample} - \left(\frac{dH}{dt}\right)_{reference}$$

The reference is an inert material such as alumina, or just an empty aluminium pan.

The enthalpy determined from the integral under the peak, above the baseline, gives totally changes for the process :

$$\int \left(\frac{dH}{dt}\right) dt = \Delta H$$

Isothermal and non-isothermal thermogravimetric techniques have commonly been used to investigate the reactivities of carbonaceous materials[3]. A plot of the rate of weight loss against temperature while burning a sample under an oxidizing atmosphere is referred to as the “burning profile”. The burning profiles of the biomass samples are shown in Figs.1–3. The first peak observed on the burning profiles of the biomass samples corresponds to their moisture release. After releasing the moisture, some small losses in the mass of the sample occurred due to desorption of the adsorbed gases. A sudden loss in the mass of the samples started at the temperatures between 200 and 250 °C, representing the release of some volatiles and their ignition. In the rapid burning region, the rate of mass loss proceeded so rapidly that it reached its maximum value

#### 4. Conclusion

The conclusions of this work are summarized as follows:

1. It was observed that the investigated the variation of initial mass showed different combustion characteristics.
2. The ignition temperatures of the samples were determined from their burning profiles. These temperatures were determined as 240,4 °C for 10 mg, 206,4 °C for 15 mg and 190,1 °C for 20 mg.
3. The burning peak temperatures were determined as 560,3 °C for 10 mg, 795, 5 °C for 15 mg and 844,4 °C for 20 mg.
4. The heat capacity were determined as 6365,16 J/g for 10 mg, 6820,55 J/g for 15 mg and 5930,45 J/g for 20 mg.

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