ITSF INDONESIA TORAY SCIENCE FOUNDATION

28th PRESENTATION CEREMONY

Science and Technology Award
Science Education Award
Science and Technology Research Grant

JAKARTA
WEDNESDAY, MARCH 16 2022

Online Ceremony ITSF 27th

Wednesday, February 17, 2021

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28th ITSF PRESENTATION CEREMONY

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MESSAGE FROM L.T. HANDOKO
THE CHAIRMAN OF INDONESIA TORAY SCIENCE FOUNDATION

In this great occasion, first of all, on behalf of the Board of Director Indonesia Toray Science Foundation (ITSF), allow me to welcome all the honorable and distinguished guests. I am very pleased that all of us are being able to attend this event. Your presence indicates our commitment and enthusiasm for the advancement of science, technology and innovation in Indonesia.

ITSF, since its establishment in December 1993 by Toray Indonesia, with full endorsement from the Ministry of Education and Culture and the Indonesian Institute of Sciences (LIPI), has been aiming to contribute in the development of science education and research in Indonesia. This program is definitely inline with our national development plan, and also the global sustainable development goals (SDGs) as well. From national perspective, science education and research are the most important key factors to achieve future prosperity of Indonesian people through science, technology and innovation (STI) based economy. The STI based economy is a necessary condition to realize sustainable development in the current 4.0 industrial revolution era. After the integration of governmental research units across ministries and agencies in Indonesia under the National Research and Innovation Agency (BRIN) on April 2021, ITSF has full endorsement from Indonesian government through BRIN.

In order to realize those goals, ITSF has established several schemes to support Indonesian science educators and researchers through research grants and scientific awards. The application is open for all Indonesian, and has been conducted in a transparent and competitive way steered by committees consisting of prominent scientists in the fields. These grants are is intended to motivate and support scientists and educators across Indonesia to continue improving the quality of their research and teaching.

On behalf of Indonesian science community, we would like to express our highest gratitude to Toray Indonesia for continuous support since the initial establishment of ITSF. ITSF has so far been awarding more than 200 Science Education Awards to science educators in the fields of biology, physics and chemistry; Science and Technology Award to 22 researchers across the fields; and providing research grants to more than 460 researchers. In 2021, ITSF has awarded 10 Science Education Awards, and disbursed 18 grants for the Science and Technology Research Grant. Unfortunately, there is no awardee for Science and Technology Award in 2021. My highest appreciation also goes to the Selection Committees for their hard work and dedication for the success of this program. Congratulations to awardees. Hopefully these would contribute significantly to the STI development in this country.

Finally, I am very grateful to the Government of the Republic of Indonesia and Japan for their encouraging supports to the ITSF program since the very beginning. My sincere gratitude particularly are addressed to the Honorable Minister of Education, Culture, Research and Technology of Indonesia, and the Honorable Chairman of National Research and Innovation Agency of Indonesia, and also to His Excellency the Ambassador of Japan to the Republic of Indonesia.

Thank You,

L.T. Handoko

MESSAGE FROM MR. AKIHIRO NIKKAKU
THE PRESIDENT OF TORAY INDUSTRIES, INC., JAPAN

Selamat pagi.

First and foremost, allow me to convey my good wishes and warmest congratulations to all the respective awards and research grants recipients.

Unfortunately, I cannot attend the ceremony due to the spread of COVID-19, so I would like to say a few words in the video.

Toray Group, founded in 1926, is an integrated chemical industry group developing its business in 29 countries and regions worldwide based on the corporate philosophy, “Contributing to society through the creation of new value with innovative ideas, technologies and products”.

In running its overseas business, Toray Group’s basic policy is to “contribute to industrial promotion, export expansion and improvement of technological level of the country from a long-term perspective.”

To promote basic scientific research and education, guided by this corporate philosophy, Toray established the Toray Science Foundation of Japan in 1960. Toray subsequently set up the Science Foundation in Indonesia, Malaysia, Thailand, and Korea with the aim of building good relationship with each country and region while contributing to each country through its business activities.

Over the years, ITSF has given awards and grants total almost 22 billion Rupiah to 798 educators and researchers for their outstanding achievements related to technology and science education, and for their contributions in natural science and basic research.

I am pleased to hear that the recipients have been achieving brilliant accomplishments such as receiving prestigious awards in the fields of science and technology in Indonesia or ranked in the top 2 % of the most influential scientists in the world.

I hope that the well-deserved reward and recognition will motivate each recipient toward accomplishing higher levels of success, while helping the Republic of Indonesia to cultivate the next generation of scientists.

ITSF could not have carried out its activities successfully without the strong teamwork and earnest participation of everyone involved. I would like to express my sincere appreciation to ITSF Chairman, Dr. Laksana Tri Handoko, members secretariat staff and all other individuals and institutions who had rendered their invaluable assistance in one way or another to ITSF.

I would like also to thank everyone here today again for your continued cooperation and support in developing activities of the ITSF. I wish everyone all the best in your future endeavors.

Terima kasih.

Akihiro Nikkaku

REPORT FROM THE SELECTION COMMITTEE FOR SCIENCE EDUCATION AWARD

For the year of 2021, the Science Education Award proposals (nominees) received through online media were 72 proposals. The number of applicants has increased about 4.3% compared to the previous year, which is not a significant increase, mainly due to the impact of covid-19 pandemic. The ratio of applicants from Java and outside Java is 42 : 30, and the ratio of applicants from senior high schools (SMA), junior high schools (SMP) and vocational schools (SMK) is 46 : 12 : 5. Similar to the previous years, the criteria used for selecting the awardees this year were still on the innovation, the originality, the simplicity, the reproducibility, and the use of local materials or local context.

On September 14 and 30, 2021, the Selection Committee had conducted online meetings and decided to invite 15 nominees to be interviewed. The online interviews for the 15 nominees were held on November 1 and 2, 2021. Based on the interview results, the Selection Committee has decided to propose 10 nominees and has approved by Board of Directors in a meeting held on December 7th 2021 to be awarded the 2021 ITSF Science Education Award. The awardees are, in alphabetical order:

1. **Anis Nur Setiyaningsih,** a biology teacher from SMP Negeri 1 Padangan, Bojonegoro, East Java, who used a simple dark box to teach and demonstrate the phototropism of the green bean sprouts.
2. **Berti Priska Gea,** a biology teacher from SMA Citra Kasih Don Bosco Pondok Indah, Jakarta, Special Capital Region, who developed the animal cell structure teaching aid from daily food.
3. **Chitra Arti Maharani,** a chemistry teacher from SMA Negeri 1 Giri, Banyuwangi, East Java, who used the characters of the popular android game to develop a card game as a teaching aid for the concept of hydrocarbon isomers.
4. **Indah Palupi,** a biology teacher from SMP Negeri 3 Pulosari, Pemalang, Central Java, who developed a catalog of Angiospermae of the surrounding school area as a teaching material of plant classifications.
5. **Ni Made Ayu Sumaningsih,** a physics teacher from SMP Negeri 1 Tanjung, Lombok Utara, West Nusa Tenggara, who used the local puppet show to teach global warming issues.
6. **Puspa Etra Junisa,** a chemistry teacher from SMA Negeri 1 Ponorogo, East Java, who developed atomic models from local and waste materials to teach various topics on molecular chemistry.

7. **R. Arifin Nugroho,** a biology teacher from SMA Kolese De Britto, Special Region of Yogyakarta, who used social media to teach enzymes in online mode.
8. **Siti Huzaemah,** a biology teacher from SMP Negeri 1 Baros, Banten, who used human palms to describe human reproduction system.
9. **Syakti Perdana Sriyansyah,** a physics teacher from BINUS School Bekasi, West Java, who developed a portable optical experiment kit to support physics laboratory-from-home during the CoViD-19 pandemic period.
10. **Yani Pinta,** a chemistry teacher from SMA Islam BS Raudhatul Jannah Payakumbuh, West Sumatra, who developed a cube puzzle game to teach substance periodical system for student with special needs / disability.

We congratulate the SEA recipients and hope to continue their innovation in science teaching.

In addition, we would like to report on February 19th, 2022, we have conducted a National Seminar Online with the theme Innovation of Science Teaching. In this national seminar the ten awardees were presented their innovations followed by questions and answers and discussions. The seminar was considered very successful attended by 260 participants, teachers from several provinces of Indonesia.

Thank you.

On behalf of the Selection Committee,

Science Education Award Selection Committee:
- **Herwindo Haribowo, Ph.D.**
- **Dr. Eng. Agus Haryono**
- **Paulus Cahyono Tjiang, Ph.D.**

REPORT FROM THE SELECTION COMMITTE FOR SCIENCE AND TECHNOLOGY

On behalf of the ITSF Selection Committee for Science and Technology, it is a great pleasure for me to present to you the report of two ITSF programs which are the 28th Science and Technology Award and the 28th Science and Technology Research Grant. In addition, the Selection Committee would like also to report another ITSF activity which is the ITSF Science and Technology Seminar held on-line on March 15, 2022. Covid-19 pandemic has changed the way ITSF processes the submission of Science and Technology Research Grant (STRG) proposals and Science and Technology Award (STA) nomination documents from physical delivery to on-line mailing. Having experienced last year, supported by a high speed internet line, ITSF secretariat and the selection committee members received all necessary documents with no difficulties.

Science and Technology Award

The Selection Committee received 24 nominations for Science and Technology Award program from 22 universities, and 2 research institutes this year. We reviewed all nomination documents, in particular on specific selection criteria aspects which include among others number and quality of paper published in scientific journal, the quality of scientific journal for publication, and scientific breakthrough claimed by the nominees. The Selection Committee found several candidates were active researchers in their specific field and made strong efforts in obtaining research funds from governments as well as from private sectors or international organizations, and we encountered slight difficulties in making decision to determine the STA winner. Finally, however, based on our in-depth evaluation regarding the ITSF STA selection criteria principles, the Selection Committee came to a decision that there was no STA winner this year.

Science and Technology Research Grant

As many as 277 research proposals were received nationwide for Science and Technology Research Grant. ITSF received 162 proposals from universities and 115 proposals from research institutes. ITSF will provide the total grant of Rp. 702,475,300.- to 18 research proposals this year, as indicated in the following Table.

Table. List of Science and Technology Research Grant Recipients

No	NAME	UNIVERSITY/RESERACH INSTITUTE	GRANT APPROVED (IDR)
1	**Apriadi Salim Adam, Sc. D.**	National Research and Innovation Agency (BRIN)	34,193,400
2	**Dr. Eng. Obie Farobie, S. Si., M. Si.**	IPB University	41,500,000
3	**Wibawa H Saputera, S. Si., M. Si., M. Sc., Ph. D.**	Institut Teknologi Bandung	40,706,400
4	**Dr. Rhesi Kristiana, S. Pi., M. Si**	YAYASAN MERO FOUNDATION	40,500,000
5	**Adi Setyo Purnomo, S. Si., M. Sc., Ph. D.**	(Indonesian Marine Education & Research Organisation)	40,000,000
6	**Dr. Musyarofah, M. Si.**	Institut Teknologi Sepuluh Nopember	40,604,700
7	**Lailatul Fithri, S. Si., M. Si.**	Institut Teknologi Kalimantan	38,500,000
8	**Lindung Zalbuin Mase, S.T., M. Eng., Ph. D.**	Univeritas Airlangga	40,706,400
9	**Dr. Dede Heri Yuli Yanto, M. Agr.**	University of Bengkulu	39,500,000
10	**Athanasia Amanda Septevani, Ph. D.**	National Research and Innovation Agency (BRIN)	39,625,000
11	**Yuana Nurulita, S. Si., M. Si, Ph. D**	National Research and Innovation Agency (BRIN)	38,500,000
12	**Dr. Ali Budhi Kusuma, S. Si., M. Sc., ALS**	University of Riau	39,300,000
13	**Dr. sc. hum. Deni Hardiansyah**	Sumbawa University of Technology	40,706,400
14	**Widhi Dyah Sawitri, S. Si., M. Agr., Ph. D**	University of Indonesia	39,250,000
15	**Popi Septiani, S. Si., M. Si., Ph. D**	Universitas Gadjah Mada	39,500,000
16	**Dr. Pande Gde Sasmita Julyantoro, S. Si., M. Si**	Institut Teknologi Bandung	37,177,000
17	**Dr. Isnaeni, M. Sc.**	Udayana University	36,416,000
18	**Woro Anindito Sri Tunjung, S. Si., M. Sc., Ph. D.**	National Research and Innovation Agency (BRIN)	38,790,000
TOTAL			**702,475,300**

The Selection Committee would like to congratulate the grantees and hope these grants will provide valuable support to help them in finishing their high quality research. We would like to encourage those who are not fortunate this time to continuously write and submit a better research proposal to ITSF next year.

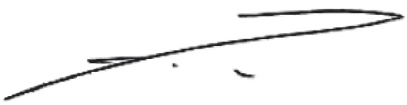
Science and Technology Seminar

The Selection Committe would like also to report that the Science and Technology Seminar was carried out successfully on-line on March 15, 2022. As many as 18 recepients of the Science and Technology Research Grant year 2020 reported and presented their research results at the Seminar. This Seminar is an event usually carried out as a forum for research information exchange among scientists, in particular those who received Science and Technology Research Grant. This is a forum where invited experts in selected fields get together to review research results reported and presented by all researchers who receive the grant a year before. The Seminar is also a learning forum not only for the presenters but also for all seminar participants who commonly come from universities and research institutes. This year, Three best presenters, one from each group of presentation were selected by the reviewers and each of them would be given a prize as a token of appreciation.

I would like to take this opportunity to thank all members of the Selection Committee for their continuous solid cooperation in the process of selection and to the ITSF Executive Boards of Directors for giving us a chance to execute this important and difficult assignment.

Finally I conclude the report of the ITSF Selection Committee for Science and Technology Year 2021 and thank you very much for your kind attention.

Jakarta, March 16, 2022
On behalf the Selection Committee,



Prof. Dr. Ir. Dedi Fardiaz, M. Sc (Chairman)
Dr. M. Aziz Majidi (Member)
Dr. Ernawati Arifin Giri Rachman (Member)

INDONESIA TORAY SCIENCE FOUNDATION
SCIENCE EDUCATION AWARD'S RECIPIENTS
28th PROGRAM - 2021

NO	NAME	TITLE	AMOUNT
1	**Anis Nur Setiyaningsih, S. Pd** SMPN 1 Padangan Bojonegoro - East Java Biology	RS (Real Study)-SR (Simple Research) Learning Model using "Black Box Phototropism	25.000.000
2	**Berti Priska Gea, S. Si, M. Pd** SMA Citra Kasih Don Bosco Pondok Indah, DKI Jakarta Biology	Miniature Animal Cells from Food on Cell Structure Materials, Practical and Affordable Practicum during Learning from Home	25.000.000
3	**Chitra Arti Maharani, S. Si, M. Pd** SMAN 1 Giri Banyuwangi - East Java Chemistry	Improving Eleventh Grade Students' Understanding and Motivation on Hydrocarbon Isomer by using "Among Us" Card Game	25.000.000
4	**Indah Palupi, S. Si., M. Pd** SMPN 3 Pulosari Pemalang, Central Java Biology	Development of an Angiospermae Catalog Book based on Local Culture as a Science Teaching Material for Plant Classification Materials	25.000.000
5	**Ni Made Ayu Sumaningsih, S. Pd** SMPN 1 Tanjung North Lombok - NTB Physics	Role Playing with The Angkrok's on Global Warming	25.000.000
6	**Puspa Etra Junisa, S.Pd** SMAN 1 Ponorogo Ponorogo - East Java Chemistry	Atomic Model Made of Clay And The Molecular Box Made Of Cardboard Waste	25.000.000
7	**R. Arifin Nugroho, S. Si., M. Pd** SMA Kolese De Britto Sleman - DI Yogyakarta Biology	Enzyme Live on Instagram to Improve Enzyme Material Understanding in Online Learning	25.000.000
8	**Siti Huzaemah, S. Pd** SMPN 1 Baros Kec. Baros, Banten Bilogy	Analogy Media of Reproductive Equipment to Improve Activities and Learning Outcomes of Class IX H Students of SMPN 1 Baros Serang Regency on The Subject of Human Reproductive System	25.000.000

9	**Syakti Perdana Sriyansyah, M. Pd** BINUS School Bekasi Bekasi - West Java Physics	Development of GO-Port KIT (Optical Wave Portable Kit) to Support LFH (Lab From Home) Activities in High School Physics Learning	25.000.000
10	**Yani Pinta, M. Pd** SMA Islam BS Raudhatul Jannah Payakumbuh West Sumatera Chemistry	Disable (Periodic Chemistry Cube Puzzle) for Diffable	25.000.000
TOTAL			**250.000.000**

INDONESIA TORAY SCIENCE FOUNDATION
SCIENCE AND TECHNOLOGY RESEARCH GRANT'S RECIPIENTS
28th PROGRAM - 2021

NO	NAME	RESEARCH TITLE	AMOUNT	FUNDED BY
1	**Apriadi Salim Adam, Sc.D.** National Research and Innovation Agency (BRIN)	A Modified Mirror Model as an extension of the standard model of particle physics and its phenomenological aspects	34.193.400	ITSF
2	**Dr. Eng. Obie Farobie, S. Si., M. Si.** IPB University	Innovation of Green Biodiesel Production from Low-Cost Feedstock in Sub-Critical Methanol and Methyl Acetate	41.500.000	ITSF
3	**Wibawa Hendra Saputera, S. Si., M. Si., M. Sc., Ph. D.** Institut Teknologi Bandung	"Development of Nano Zeolite Y Catalysts for Phenolic-Compounds Removal using Catalytic Ozonation Technology"	40.706.400	ITSF
4	**Dr. Rhesi Kristiana, S. Pi., M. Si.** MERO FOUNDATION (Indonesian Marine Education & Research Organisation)	Assessment of Biological Activity of Bacteria associated with Nudibranchs from Tulamben of Bali through Microbiome approach against MDR Pathogens	40.500.000	ITSF
5	**Adi Setyo Purnomo, S. Si., M. Sc., Ph. D.** Institut Teknologi Sepuluh Nopember	Decolorization and Biodegradation of Batik Wastewater Methylene Blue by Immobilized Brown-rot Fungi in PVA/ Alginate/MOF Matrixes	40.000.000	ITSF
6	**Dr. Musyarofah, M. Si.** Institut Teknologi Kalimantan	The Structural Changes of Mg1-XZnxTiO3 during Thermodynamic Condition and Their Optical Characteristics: A New Potential Candidate for Photoanode in Dye-Sensitized Solar Cell	40.604.700	ITSF
7	**Lailatul Fithri, S. Si., M. Si.** Univeritas Airlangga	Creating Combination of Organic-Chemical Fertilizer using Natural Zeolite Excelzyme Immobillization	38.500.000	ITSF
8	**Lindung Zalbuin Mase, S.T., M. Eng., Ph. D.** University of Bengkulu	Liquefaction Assessment Based on Finite Element Modelling for Seismic Hazard Mitigation in Bengkulu City	40.706.400	ITSF

9	**Dr. Dede Heri Yuli Yanto, M.Agr.** National Research and Innovation Agency (BRIN)	Covalent laccase immobilization onto functionalized halloysite nanotubes using amino acids as green crosslinker for low-cost textile dye wastewater treatment	39.500.000	ITSF
10	**Athanasia Amanda Septevani, Ph. D.** National Research and Innovation Agency (BRIN)	3D Nanocellulose with Tunable Antibacterial Properties for Functional Medical Dressing	39.625.000	ITSF
11	**Yuana Nurulita, S. Si., M. Si, Ph. D** University of Riau.	Elicitation of Antioxidant and Free Radical Scavenging Compounds by Riau Local Fungal Isolates, Penicillium – Trichoderma Co-Cultures using Metabolomic Investigation.	38.500.000	ITSF
12	**Dr. Ali Budhi Kusuma, S. Si., M. Sc., ALS** Sumbawa University of Technology	Bioprospecting Thermophilic Actinobacteria Isolated from The Caldera of Mt.Tambora Volcano in Sumbawa Island for Novel Antibiotics Discovery	39.300.000	ITSF
13	**Dr. sc. hum. Deni Hardiansyah** University of Indonesia	Investigating the Accuracy of a Simplified Treatment Planning in Molecular Radiotherapy based on One-time Point Measurement using a NLME and a PBPK Model	40.706.400	ITSF
14	**Widhi Dyah Sawitri, S. Si., M. Agr., Ph. D.** Universitas Gadjah Mada	Exploring Protective Genes Expressed in Shallot (Allium cepa L. Aggregatum-Group) against Fusarium Acutatum and Strategies to Develop a Climate-resilient Crop through ultraviolet-B Radiation System	39.250.000	ITSF
15	**Popi Septiani, S. Si., M. Si., Ph. D** **Institut Teknologi Bandung**	The Whole Genome Sequencing of Curcuma Longa L. as Milestone for Newly Improved Variety in Turmeric Breeding Program	39.500.000	ITSF
16	**Dr. Pande Gde Sasmita Julyantoro, S.Si., M.Si** Udayana University	The Potency of Bacillus spp. to Degrade AHPND Toxin Protein of Aquaculture Pathogenic Vibrio Parahaemolyticus.	37.177.000	ITSF
17	**Dr. Isnaeni, M. Sc.** National Research and Innovation Agency (BRIN)	High Reusability of Solar-heated Oil Absorbent Based-on Carbon Quantum Dots and Silver Nanoparticles for Solving Oil-spill in The Oceans	36.416.000	Toray Science Foundation Japan
18	**Woro Anindito Sri Tunjung, S. Si., M. Sc., Ph. D.** Universitas Gadjah Mada	Biosynthesis of Terpenoid and Steroid in Kaffir Lime (Citrus hystrix DC.) Callus Culture For Standardized Herbal Medicines of Breast Cancer	38.790.000	Toray Science Foundation Japan
TOTAL			**705.475.300**	

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

RS (Real Study)-SR (Simple Research) Learning Model using "Black Box Phototropism"

1. Subject : Biology

2. Receiver

Name : **ANIS NUR SETIYANINGSIH, S. Pd.**
Sex : Female
Place/Date of Birth : Bojonegoro, 3 July 1991
School : SMP Negeri 1 Padangan
School Address : Jl. Diponegoro No.117 Padangan, Kec. Padangan, Kab. Bojonegoro Jawa Timur 62162
Phone/Fax Number : (0353) 551418 No. Fax: -
Email Address : spensapa1@gmail.com

3. Proposal Summary :

The RS (Real Study) – SR (Simple Research) learning model by using Black Box Phototrophism is the result of our innovation as science (Natural Science) teachers in SMP Negeri 1 Padangan. The aim of this innovation creation is to encourage the students to be more enthusiastic and passionate about learning science (Natural Sciences).

We applied the RS (Real Study) – SR (Simple Research) learning model using Black Box Phototrophism to investigate the effect of light color on the magnitude of the phototrophism motion of mung bean sprouts (vigna radiata). Based on the experimental results, the results are extraordinary. It turned out that the results were correct for each color of the different angles of turn of the sprouts. The smallest turning angle is indicated by the red light. The largest turning angle is indicated by the purple light.

The students get a lot of experiences after following the RS(Real Study)-SR(Simple Research) learning model using Black Box Phototrophism: 1). Real learning experience (RS-Real Study). 2). Simple research learning experience (SR-Simple Research). 3). Integrated science learning experience (combining 3 basic sciences; Physics, Biology, and Mathematics). So that the scientific treasure of students is getting deeper, wider, and stable.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Miniature Animal Cells from Food on Cell Structure Materials, Practical and Affordable Practicum during Learning from Home

1. **Subject** : Biology
2. **Receiver**

Name	: **BERTI PRISKA GEA, S. Si, M. Pd.**
Sex	: Female
Place/Date of Birth	: Gunungsitoli, 10th July 1993
School	: Sekolah Citra Kasih Don Bosco Pondok Indah
School Address	: Jl. Duta Indah, Pondok Indah RT. 16/RW. 6 Cilandak, Jakarta Selatan, DKI Jakarta 12430
Phone/Fax Number	: 082122593497 Fax No: -
Email Address	: berti.gea@citrakasih.sch.id

3. **Proposal Summary** :

Learning from home is a challenge in learning including in Biology Subject which is closed to practical activities. Lack of direct interaction and boredom during online learning reduced interest in learning, moreover the cell structure material is one of the materials that is difficult for students to understand. Through this practicum, students learned various cell organelles and their functions in practical activities of miniature animal cells from food ingredients that are close to students' daily life hence they are easy to obtain and create.

Students used some food ingredients available at home and designed the organelles based on the given concept. Animal cell miniature is a simple, practical, fun, and easy practicum for students even with limited facilities at home or school. This practicum innovation also increases engagement between teachers and students, increases interest, creativity, memory, understanding of material, and the applicative of learning.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Improving Eleventh Grade Students' Understanding and Motivation on Hydrocarbon Isomer by using "Among Us" Card Game

1. **Subject** : Chemistry
2. **Receiver**
   Name : **CHITRA ARTI MAHARANI, S. Si, M. Pd.**
   Sex : Female
   Place/Date of Birth : Bayuwangi/ 12th January 1981
   School : SMAN 1 Giri
   School Address : Jl. HOS Cokroaminoto No. 38
   Giri, Banyuwangi - East Java 68425
   Phone/Fax Number : 082244968927 Fax No: -
   Email Address : artichitra2017@gmail.com

3. **Proposal Summary** :

One of learning methods which is applied in Chemistry Subjects is playing Hydrocarbon isomer cards (Alkanes, Alkenes, Alkynes). This media is adopted from "Among us" game and inspired by Ki Hajar Dewantara's philosophy about the nature and the era which are brought by every child. There are 40 Among us cards which consist of 10 hydrocarbon compounds include Alkanes, Alkenes, Alkynes and each compound is made into four isomers. This game needs 3-4 players. The "Among Us" isomer cards are made from 60 gr artpaper and 8.7 cm x 6.3 cm. The front page contains the title of the card, the 3D molecular formula (using the molview.org application) and the name of the compound, while the back page contains a picture of Among Us.

Based on the result of trial on 9 students by using the "Among Us" card media, the average post-test score is 82,22 with 88,89% of mastery learning. In addition, the result of test and questionnaires on students' responses show that this media has been proven to be effective and interesting for students because it can increase students' understanding and motivation to learn Hydrocarbon isomer.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Development of an Angiospermae Catalog Book based on Local Culture as a Science Teaching Material for plant Classification Materials

1. **Subject** : Biology
2. **Receiver**

Name	: **INDAH PALUPI, S. Si., M. Pd.**
Sex	: Female
Place/Date of Birth	: Pemalang, 19 Juli 1976
School	: SMP Negeri 3 Pulosari
School Address	: Jl. Raya Pagenteran - Pulosari Pemalang, Central Java 52355
Phone/Fax Number	: - Fax No: -
Email Address	: littlelupy@gmail.com

3. **Proposal Summary** :

Science learning is identical to practical activities which are usually carried out through observation or experiments in the laboratory. During the Covid-19 pandemic, science practicum at SMP Negeri 3 Pulosari continues, one of which is by utilizing the environment as a learning resource which has not been used optimally. Natural resources of plants inspired me to develop science learning innovations.

The innovation that I developed was a catalog of flowering plants (angiosperms) based on local wisdom as teaching materials for plant classification. This book was compiled based on the results of observations on the types of flowering plants in the Pulosari sub-district.

This catalog book has been used by grade VII students in science learning and serves as a guide in compiling a catalog of flowering plants in the school environment. In addition, this catalog book is useful for students in recording local types of (flowering) plants that have the potential to improve the local community's economy.

The use of a catalog of flowering plants based on local wisdom is proven to be able to increase students' understanding, active learning, creative thinking skills, and concern for the environment. Science learning becomes more interesting, creative, and meaningful.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Role Playing with The Angkrok's on global Warming

1. **Subject** : Science
2. **Receiver**

Name : **NI MADE AYU SUMANINGSIH**
Sex : Female
Place/Date of Birth : Tanjung.January 03, 1989
School : SMP Negeri 1 Tanjung
School Address : Jl. RayaTioq Tata Tunaq,
North Lombok - NTB 83352
Phone/Fax Number : (0370) 6131807 Fax No:(0370) 6131807
Email Address : smpn1tanjungklu@gmail.com

3. **Proposal Summary** :

Learning process at school activities had been created problematic situation for two years since natural disaster of earthquake 7,0 SR hit Lombok in 2018. Thousands of houses were damaged and almost all schools were destroyed that teachers and students did not conduct normal learning process. Trauma healing continually did for keeping students motivation that I could design innovative learning media.

The material on the process of global warming is obviously abstract even though the impact is real. To make easy for student to understand it, the teacher and students collaborate to apply simulation role play of Angkrok. The students draw characters of greenhouse gases as monsters (CO_2, CH_4, CFC, and NO) and Ozone as super hero.

This was proposed as one of the innovative learning with some advantages. Firstly, this innovation had me get the first winner in the teacher competition at level of North Lombok district. Secondly, learning process by Angkrok's media was something different that student easy to understand the abstract by integrated story of HOTs, TPACK based on 21 century learning skills for student to be more active. The student got direct learning experience by engaging this role play with interesting picture adapted story in this media.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Atomic Model Made Of Clay And The Molecular Box Made of Cardboard Waste

1. **Subject** : Chemistry
2. **Receiver**

Name	: **PUSPA ETRA JUNISA S. Pd.**
Sex	: Female
Place/Date of Birth	: Madiun, 14 June 1990
School	: SMA Negeri 1 Ponorogo
School Address	: Jl. Budi Utomo No.1, Kel. Ronowijayan, Kec. Siman, Kab. Ponorogo, East Java.
Phone/Fax Number	: (0352) 481145 No. Fax: (0352) 481145
Email Address	: ganesha@smazapo.sch.id

3. **Proposal Summary** :

The distinctivity of chemistry compared to the other natural sciences lies in its abstraction. Due to this abstraction, many students find it hard in learning chemistry. Therefore, chemistry teachers are required to find a solution to minimize the abstraction.

The atomic model made of clay and the molecular box made of cardboard waste is one of the solutions to overcome the abstraction related to material: representing the elemental molecules, compound molecules, reaction processes between elements that react to form compounds, coefficient numbers, and balancing chemical equations.

The results of this experiment (study) in learning chemistry is encouraging: Students found that chemistry is no longer abstract, they found it clearer and more obvious. Students found chemistry is fun. Students found chemistry is easier.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Enzyme Live on Instagram to Improve Enzyme Material Understanding in Online Learning

1. **Subject** : Biology
2. **Receiver**

Name	: **R. ARIFIN NUGROHO, S. Si., M. Pd.**	
Sex	: Male	
Place/Date of Birth	: Kulon Progo, 23th February 1978	
School	: SMA Kolese De Britto	
School Address	: Jl. Laksda Adisucipto 161 DKI Yogyakarta 55281	
Phone/Fax Number	: (0274) 554248	Fax No: (0274) 547606
Email Address	: kolese@debritto.sch.id	

3. **Proposal Summary** :

After the pandemic, online learning will be combined with offline in order to make it more effective. Moreover, the students are Generation Z and 38% of social media users use Instagram as a news reference.

Enzyme learning is an absurd because of the biomolecular level. Practicum is a suitable learning model to understand the concept of enzymes. But so far, enzyme practicum has to be carried out in a laboratory with expensive materials.

"Enzyme Live on Instagram" is a practice from home. The materials used are simple; without reducing the validity and the depth of the material. There are 6 different types of practicums that allow students to learn from each other. Students in groups make invitation posters to take part in the live enzyme practicum on Instagram. The aim of the group to conduct a live talk show for practicing enzyme testing and discussing through Instagram.

Students feel happy and could learn graphic design through poster work. Students were able to build a cross-material perspective. Peer assessments showed "very good" results on responsibility (80.2%), cooperation (76.7%), and involvement (75.9%). Students (124 persons) have an average score of 86.7. For schools, this is a means of branding and public accountability.

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"AWARDING PROPOSAL"

Analogy Media of Reproductive Equipment to Improve Activities and Learning Outcomes of Class IX H Students of SMPN 1 Baros Serang Regency on The Subject of Human Reproductive System

1. **Subject** : Biology
2. **Receiver**

Name	: **SITI HUZAEMAH, S. Pd.**
Sex	: Female
Place/Date of Birth	: Pandeglang, 19 Januari 1974
School	: SMP Negeri 1 Baros
School Address	: Jl. Raya Pandeglang Serang KM. 14, Kec Baros, Kabupaten Serang, Banten 42173
Phone/Fax Number	: - Fax No: -
Email Address	: smpnsatubaros@yahoo.co.id

3. **Proposal Summary** :

The reproductive system is a very exciting subject for students who have just reached puberty. Media images or charts that have been used to convey the subject of the reproductive system are only observed without any practical activities being carried out. As a result, learning media images that should attract student interest became indifferent and their learning outcomes on the subject are low.

The author aware that when both palms were placed next to each other's, the lines of the palm and the shape resembles the inner female reproductive organs. The author tries to use this media in the learning process.

Learning process is done by students creating pictures of the female reproductive organs using a pattern of lines on the palms of their hands, coloring the parts formed, labeling them, and presenting the pictures.

Learning outcome showed that the students' learning completeness reached 86.84%, meanwhile the conventional method-learning outcome is 85.32. This number has exceeded the KKM for science subjects at SMPN 1 Baros, which is 72. Student activities include group collaboration, as well as drawings that have been successfully completed. Group collaboration involves member activity, work techniques, independence, and punctuality. For the image includes the pattern formed, the clarity of each part and the accuracy of labeling.

The results of the performance assessment showed that five groups received a 'very good' predicate and four groups received a 'good' predicate. This means that the overall performance of the group has shown the expected performance, which is at least 'good' predicate.

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"AWARDING PROPOSAL"

Development of GO-Port KIT (Optical Wave Portable Kit) to Support LFH (Lab From Home) Activities in High School Physics Learning

1. **Subject** : Physics Education
2. **Receiver**

Name	: **SYAKTI PERDANA SRIYANSYAH, M. Pd.**
Sex	: Male
Place/Date of Birth	: Banjarmasin, 21 November 1990
School	: Binus School Bekasi
School Address	: Jl. Saraswati No. 1, Vida Bumiwedari, Bekasi, Jawa Barat 17156
Phone/Fax Number	: (021) 826 7799 Ext. 7787-7789 No. Fax: -
Email Address	: syaktiperdana@gmail.com

3. **Proposal Summary** :

The COVID-19 pandemic requires teachers and students to adapt quickly to online learning. There are many difficulties that arise during the adaptation process. Especially for Physics teachers, apart from having to design interactive learning that activates students during class, they also must think creatively to keep doing practical sessions. The main problem is how to design an experimental activity without using equipment in the laboratory. This situation motivated the author to design a GO-Port KIT that supports practical activities with interesting and unique ideas without using tools from school laboratories and packaged into lab activities from home.

The GO-Port KIT is a set of portable optical wave experiment kits made of inexpensive, easy-to-obtain tools, assisted by smartphone, and flute. KIT facilitated four experiments, including measuring the speed of sound, refractive index, slits separation, and critical angle. KIT is equipped with a science-process-based laboratory manual. As a result, students can understand the concepts of calculating the speed of sound, the refractive index, the critical angle and distance between adjacent slits through fun experimental activities that can be done from home. This KIT also has a great opportunity for further development so that it can include a more complete Optical Wave experiment.

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"AWARDING PROPOSAL"

Disable (*Periodic Chemistry Cube Puzzle*) for Difable

1. **Subject** : Chemistry
2. **Receiver**

Name	: **YANI PINTA, M. Pd.**
Sex	: Female
Place/Date of Birth	: Kab 50 Kota, 12 Januari 1984
School	: SMA Islam Boarding School Raudhatul Jannah
School Address	: Jl. Prof. Dr. Hamka Kel. Kaning Bukit, Nagari Tigo Koto Dibaruah Kec. Payakumbuh Utara, Kota Payakumbuh Sumatera Barat 26215
Phone/Fax Number	: (0752) 94667 Fax No: -
Email Address	: yanipinta012@gmail.com

3. **Proposal Summary** :

Islamic Senior High School Raudhatul Jannah Payakumbuh is not an inclusive school, but 10% of them are Students with Special Needs (PDBK). They are speech defect, low vision, social impairment and autism. The implementation of classroom learning still uses the same method for all students so that learning is not optimal for PDBK, including chemistry learning. One of the learning media for chemistry in the inclusive class is Disable (Periodic Chemistry Cube Puzzle) for Difable. The cube puzzle of the periodic system of chemistry media conveys material and learning objectives for the periodic system and elemental chemistry for PDBK. Each of the 6 sides of the cube is arranged to form a puzzle of the periodic system, the benefits of elements, chemists, chemical crossword puzzle, Indonesian mining maps and the integration of Al-Qur'an science. This study aims to determine the effect of Disabled for Difable media on learning outcomes and learning interest. This study uses a quasi-experimental method with a one group pre-test-post-test design. Learning outcomes data were analyzed using N-Gain and learning interest data were analyzed by the percentage of implementation. The results of the study obtained an N-Gain value of 0.78 in the high category and the percentage of GDPK learning interest was 90%. That is, the Disable for disabled media improves learning outcomes and interest in learning chemistry for students with special needs.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

A Modified Mirror Model as an Extension of the Standard Model of Particle Physics and Its Phenomenological Aspects

1. Research Team Leader

Name	: **APRIADI SALIM ADAM, SC. D.**
Sex	: Male
Place/Date of Birth	: Ampana, April 21, 1987
University/Institution	: Research Center for Physics, National Research and Innovation Agency (BRIN)
Department/Faculty	: -
Address of Institution	: PUSPIPTEK Area, Building 440-442, Muncul, Setu, Kota Tangerang Selatan, Banten 15314
Phone/Fax Number	: (021) 7560556 Fax No: (021) 7560554
Email Address	: apriadi.adam@gmail.com; apriadi.salim.adam@brin.go.id

2. Research Field : Theoretical Particle Physics
3. Number of Researcher(s) : 2 (two)
4. Research Location : Research Center for Physics (BRIN)
5. Time Allocation : February 1st,2022 – January 31st,2023
6. Research Grant : Rp. 34,193,400.00
7. Summary of Research Proposal :

What is still not yet fully understood is how the standard model (SM) of particle physics can explain several fundamental problems such as neutrino oscillation, neutrino mass hierarchies, baryon asymmetry of universe, dark matter and dark energy. This indicates a need to extent SM.

One of the extensions of the SM is to introduce Left-Right Symmetry (LRS) model. Although the LRS model is no longer center of attention in particle physics community, there is no physical fact or observation from the experiment that ruled out the LRS model and it is also applied for the LRS model variant such as the mirror model. Then, it is of interest to propose the modified mirror model based on the LRS model or the mirror model.

In the proposed model, we will investigate the aforementioned problems beyond the SM. We perform the advanced calculation and simulations by using the existing computer with the help of mathematical programming software. In addition, by studying the collider physics of the proposed model, we expect that the parameters of the proposed model could be tested at near-future experiments such as LHC, SLAC, and Fermilab.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Innovation of Green Biodiesel Production from Low-Cost Feedstocks in Sub-Critical Methanol and Methyl Acetate

1. Research Team Leader

Name	:	**Dr. Eng. OBIE FAROBIE, S. Si., M. i.**
Sex	:	Male
Place/Date of Birth	:	Serang / 11 July 1984
University/Institution	:	IPB University
Department/Faculty	:	Dept. of Mechanical and Biosystem Engineering/Faculty of Agricultural Engineering and Technology
Address of Institution	:	Dept. Teknik Mesin dan Biosistem, IPB Darmaga Campus, Bogor 16002
Phone/Fax Number	:	(0251) 8621210 / (0251) 8621210
Email Address	:	obiefarobie@apps.ipb.ac.id

2. Research Field	:	Energy
3. Number of Researcher(s)	:	3
4. Research Location	:	IPB University, Bogor, Indonesia
5. Time Allocation	:	10 months (4 April 2022–3 Feb 2023)
6. Research Grant	:	Rp. 41,500,000.00
7. Summary of Research Proposal	:	

It could not be denied that most of the energy used for daily needs are from fossil fuels. The endless dependency on fossil fuels causes two main drawbacks, i) severe environmental damage owing to the emissions of air polluting matters, and ii) unsustainability for a more extended period. Therefore, this study aims to utilize the low-cost feedstock (PFAD) in more sustainable and environmentally benign way for biodiesel production. Transesterification is carried out in subcritical methanol and methyl acetate using the batch reactor. Biodiesel production from PFAD in subcritical methanol and methyl acetate is investigated in the temperature range of 160–220 °C, PFAD-to-reactant molar ratios of 1:4, 1:6, and 1:8, and under a range pressure of 5-15 MPa. The transesterification reaction is performed for 10–50 min. The properties of biodiesel, i.e., specific density, kinematic viscosity, and FFA were determined according to Indonesia National Standard for biodiesel called SNI 7182:2015. Biodiesel products will be analyzed using A gas chromatograph (GC) equipped with a flame-ionization detector. Biodiesel yields from the experimental results are calculated by dividing the moles of biodiesel product by moles of initial PFAD. Reaction kinetics of transesterification of PFAD under sub-critical conditions will be deduced.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Development of Nano Zeolite Y Catalysts for Phenolic-Compounds Removal using Catalytic Ozonation Technology

1. Research Team Leader

Name	: **Dr. WIBAWA HENDRA SAPUTERA**
Sex	: Male
Place/Date of Birth	: Bandung, 1 April 1989
University/Institution	: Bandung Institute of Technology (ITB)
Department/Faculty	: Dept of Chemical Engineering/Fac of Industrial Technology
Address of Institution	: Kampus ITB, Jl. Ganesha No. 10 Bandung, Jawa Barat 40132
Phone/Fax Number	: (022) 2500989, Fax No: (022) 2501438
Email Address	: hendra@che.itb.ac.id

2. Research Field	: Photocatalysis, electrocatalysis, catalytic ozonation
3. Number of Researcher(s)	: 3
4. Research Location	: Labtek X Building, ITB
5. Time Allocation	: 12 months
6. Research Grant	: Rp. 40,706,400.00
7. Summary of Research Proposal	:

Phenol compounds can be found in several industrial wastewater processes, such as petroleum, coal processing, petrochemical, coking operations, paper industry, etc. Catalytic ozonation technology has been applied to remove phenol compounds due to their high oxidizing ability and generate high catalytic efficiency. Zeolites with high silica content have been widely used as catalysts in catalytic ozonation processes to degrade various organic compounds, including phenols. The use of zeolite as a catalyst in the catalytic ozonation process needs to consider several parameters, including hydrophilicity/ hydrophobicity, the ratio of silica to alumina (SiO_2/ Al_2O_3), specific surface area, acidity, and pore size of the zeolite. The main objective of this research proposal is to obtain the optimum efficiency of phenol degradation from wastewater using catalytic ozonation technology with a zeolite- Y catalyst. Zeolite Y will be synthesized using the ultrafast synthesis method with a tubular reactor with a batch system. The synthesized zeolites were characterized using XRD, SEM, TEM, XRF, and BET. Phenol degradation efficiency was measured using high-performance liquid chromatography (HPLC) and UV-vis spectrophotometry. The catalytic ozonation technology is expected to be an alternative technology developed on a pilot scale to overcome industrial waste problems, especially in Indonesia.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Assessment of Biological Activity of Bacteria Associated with Nudibranchs from Tulamben of Bali Through Microbiome Approach Against MDR Pathogens

1. Research Team Leader

Name	: **Dr. RHESI KRISTIANA**
Sex	: Female
Place/Date of Birth	: Madiun, 1 Februari 1992
University/Institution	: MERO Foundation
Department/Faculty	: -
Address of Institution	: Banjar Dinas Muntig, Tulamben, Kubu Karangasem, Bali 80853
Phone/Fax Number	: -
Email Address	: rhesikristiana@merofoundation.org

2. Research Field	: Marine Microbiology
3. Number of Researcher(s)	: 3
4. Research Location	: Tulamben, Kubu, Karangasem, Bali
5. Time Allocation	: 1 year
6. Research Grant	: Rp. 40,500,000.00
7. Summary of Research Proposal	:

Antibiotic resistance is growing to be a serious worldwide health problem, as indicated by the prevalence of MDR pathogens. The demand for antibiotics in the health sector continues to increase along with the rapid mutation process of microbes and their ability to infect humans. Marine bacteria and their associated invertebrate hosts, especially the nudibranchs, have a vast potential that needs to be investigated for their function in the sustainable search for marine drugs. However, the history of discovering nudibranch-associated bacteria and detecting chemical cues between nudibranchs and their food source is still based on random sampling.

This study aims to assess the diversity of bacteria associated with nudibranchs collected based on the type of food and determine the antibacterial potential against MDR pathogens. This study will utilize microbiological techniques (bacteria isolation, purification), chemical (profiling of chemical compounds as a source for drug discovery by LCMS), and molecular techniques (DNA barcoding and Next Generation Sequencing).

This proposed study is expected to enrich the marine natural product research in Indonesia. To achieve the goals, the following activities will be carried out: a sampling of nudibranchs, isolation of their associated bacteria, anti-MDR screening, bacterial characterization, and chemical profiling of the prospective compounds.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Decolorization and Biodegradation of Batik Wastewater Methylene Blue by Immobilized Brown-rot Fungi in PVA/Alginate/MOF Matrixes

1. Research Team Leader

Name	: **ADI SETYO PURNOMO, S. Si., M. Sc., Ph. D.**
Sex	: Male
Place/Date of Birth	: Surabaya, 24 July 1980
University/Institution	: Sepuluh Nopember Institute of Technology (ITS)
Department/Faculty	: Dept. Chemistry / Fac. Science and Data Analytics
Address of Institution	: Kampus ITS Sukolilo, Surabaya, Jawa Timur 60111
Phone/Fax Number	: (031) 594-3353 No. Fax: (031) 592-8314
Email Address	: adi.spurnomo@yahoo.com

2. Research Field : Chemistry
3. Number of Researcher(s) : 2 People
4. Research Location : ITS, Surabaya
5. Time Allocation : 12 Months
6. Research Grant : Rp. 40,000,000.00
7. Summary of Research Proposal :

Methylene blue (MB) dye is a cationic dye which has wide application in the batik industry, that may cause some adverse effects. Therefore; efficient, environmentally friendly, and inexpensive methods for removing MB from dissolved systems remain a challenge. The purpose of this study is to synthesize and characterize new super material consisting of combination of brown-rot fungi (BRF: *Gloeophyllum trabeum and Daedalea dickinsii*) which is immobilized in a combination of PVA-alginate-metal organic framework (MOF) matrixes and to evaluate its degradation ability in MB. BRF have ability to degrade some organic pollutants including dyes by using Fenton reaction mechanism by producing hydroxyl radicals, while UiO-66 is one of MOF that has good ability to absorb some dyes. The new super-adsorption composites with BRF immobilized system offers fast dye adsorption speed by MOF, supported by the bio-degradation process by the BRF, thus it is expected that this system can degrade dyes more efficient and reusable. The effect of the combination of the composite will be evaluated and characterized for its properties (FTIR, DSC-TGA, SEM, BET). The super-adsorption-immobilized BRF-composites are then applied to decolorize MB dye and the metabolites of degraded MB will be identified by LCMS.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

The Structural Changes of $Mg_{1-x}Zn_xTiO_3$ During Thermodynamic Condition and Their Optical Characteristics: A New Potential Candidate for Photoanode in Dye-Sensitized Solar Cell

1. Research Team Leader

Name	: **Dr. MUSYAROFAH, M. Si.**
Sex	: Female
Place/Date of Birth	: Pemalang, 29 Januari 1991
University/Institution	: Institut Teknologi Kalimantan
Department/Faculty	: Dept of Physics / Fac of Science, Food Technology, and Maritime Affairs
Address of Institution	: Jl. Soekarno-Hatta Km. 15, Balikpapan, Kalimantan Timur 76127
Phone/Fax Number	: (0542)8530800 Fax No: (0542)8530800
Email Address	: musyarofah@lecturer.itk.ac.id

2. Research Field	: Materials Science
3. Number of Researcher(s)	: 2 (two)
4. Research Location	: Institut Teknologi Kalimantan
5. Time Allocation	: September 2021 – September 2022
6. Research Grant	: Rp. 40,604,700.00
7. Summary of Research Proposal	:

The development of clean, renewable and sustainable energy sources has become an indispensable strategy to solve the problem of the energy source crisis. Among renewable energy, solar energy is a promising source. Dye-sensitized solar cell (DSSC) is a generation of solar cells whose research is still ongoing to increase efficiency. In this project, the development of new materials as candidates for replacement of old semiconductor materials in DSSC photoanode components will be conducted, i.e. nano $Mg_{1-x}Zn_xTiO_3$. The study of the evolution of the crystal structure, electronic structure and local atomic environment of the $Mg_{1-x}Zn_xTiO_3$ system under in situ thermodynamic conditions will give explanation on the optical phenomena and potential applications of this material as a DSSC photoanode. In the present research, the synthesis and structural studies of $Mg_{1-x}Zn_xTiO_3$ powders prepared by dissolved metals mixing method is proposed. A comprehensive study of the changes of the structure, local coordination, and electronic environment of the systems during thermodynamic condition will be examine using several advanced characterization techniques, i.e. HT-XRD, TR-XAS, DTA-TGA, FTIR, TEM. Moreover, the optical properties investigation is carried out using UV-VIS spectrophotometer to acquire the band gap and absorption behavior of $Mg_{1-x}Zn_xTiO_3$ systems regarding their application as photoanode in DSSC.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Creating Combination of Organic-Chemical Fertilizer Using Natural Zeolite Excelzyme Immobillization

1. Research Team Leader

Name	:	**LAILATUL FITHRI, S. Si., M.Si.**
Sex	:	Female
Place/Date of Birth	:	Gresik, Apr 16th, 1990
University/Institution	:	Universitas Airlangga
Department/Faculty	:	-
Address of Institution	:	Kampus C UNAIR, Jl. Mulyorejo Surabaya, Jawa Timur 60511
Phone/Fax Number	:	(031) 5914042 Fax No: (031) 5981841
Email Address	:	info@biome.unair.ac.id

2. Research Field	:	Sains
3. Number of Researcher(s)	:	3
4. Research Location	:	Proteomic Laboratory, Research Center for Bio-Molecule Engineering, Universitas Airlangga
5. Time Allocation	:	12 month
6. Research Grant	:	Rp. 38,500,000.00
7. Summary of Research Proposal	:	

Indonesia is an agricultural country that has a lot of agricultural products. Inorganic fertilizers are the most widely used fertilizers in agriculture in the world, but excessive use of chemical fertilizers can lead to a decrease in soil fertility. Zeolite is a mineral that quite abundant in Indonesia. Natural zeolites of sedimentary origin are widely used in agriculture both as individual fertilizer and a mix of mineral and organic fertilizers. Excelzyme is consortium enzymes produced by Proteomic Laboratory, Univeristy of CoE - Research Center for Bio-Molecule Engineering that contains lignocellulolytic enzyme. Lignocellulolytic enzymes formed an enzyme complex consisting of the enzyme cellulase and hemicellulose. These enzymes have the potential to be used to degrade biomass waste that is still left in the soil after harvesting. Natural zeolite is activated at high temperature before being immobilized with enzymes, the immobilization method used is co-precipitation.

This research aims to immobilize consortium enzyme onto natural zeolite as a potential organic fertilizer. The enzymes immobilized in zeolite is expected to synergize with zeolite to restore soil fertility which has decreased due to excessive use of chemical fertilizers.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Liquefaction Assessment Based on Finite Element Modelling for Seismic Hazard Mitigation in Bengkulu City

1. Research Team Leader

Name	:	**LINDUNG ZALBUN MASE, Ph. D.**
Sex	:	Male
Place/Date of Birth	:	Bengkulu, 13 April 1988
University/Institution	:	University of Bengkulu
Department/Faculty	:	Dept of Civil Engineering Fac of Engineering
Address of Institution	:	Kampus UNIB Jl. WR. Supratman No. 2 Kota Bengkulu, Bengkulu 38371
Phone/Fax Number	:	(0736) 21170 & 21884 (0736) 22105
Email Address	:	lmase@unib.ac.id

2. Research Field	:	Geotechnical Earthquake Engineering
3. Number of Researcher(s)	:	2
4. Research Location	:	Bengkulu City
5. Time Allocation	:	1 year
6. Research Grant	:	Rp. 40,706,400.00
7. Summary of Research Proposal	:	

Bengkulu City is known as a developing city located in western coast of Sumatra Island. Bengkulu is also surrounded by several earthquake sources such as subduction zone of Sumatra Island, Mentawai Fault, Sumatra Fault, and Kaba Active Volcano. Under this condition, Bengkulu City is very vulnerable to undergo earthquake. After the great earthquake of Palu in 2018, the concern on the earthquake effect, such as liquefaction becomes very critical issue as the followed disaster during earthquake. Therefore, as the mitigation effort, study of liquefaction in Bengkulu City should be prioritized.

This study focused on the site investigation to the area of Bengkulu City. Geophysical measurement and geotechnical measurement are conducted. The measurement results are then depicted to describe the soil profile condition in Bengkulu City. A sophisticated approach on the basis of numerical modelling is used to model liquefaction phenomenon in Bengkulu City. A couple of finite element and ground response analyses are conducted to determine level of vulnerability under liquefaction in the study area In general, this research could result in the better understanding of liquefaction potential in the study area. This research is also able to suggest local government to consider earthquake, such as liquefaction in Bengkulu City.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Covalent Laccase Immobilization onto Functionalized Halloysite Nanotubes using amino acids as Green Crosslinker for Low-cost Textile Dye Wastewater Treatment

1. Research Team Leader

Name	:	**Dr. DEDE HERI YULI YANTO, M. Agr.**
Sex	:	Male
Place/Date of Birth	:	Jakarta, July 10, 1981
University/Institution	:	National Research and Innovation Agency
Department/Faculty	:	Research Center for Biomaterials
Address of Institution	:	Jl. Raya Bogor Km. 46 Cibinong, Bogor 16911
Phone/Fax Number	:	(021) 87914511 Fax No: (021) 87914510
Email Address	:	dede.heri.yuli.yanto@brin.go.id; dede@biomaterial.lipi.go.id

2. Research Field	:	Bioprocess and Bioremediation
3. Number of Researcher(s)	:	3
4. Research Location	:	Research Center for Biomaterials, BRIN
5. Time Allocation	:	12 months
6. Research Grant	:	Rp.39,500,000.00
7. Summary of Research Proposal	:	

Extensive use of textile dyes without proper wastewater treatment may jeopardize the water environment. Finding suitable material for simultaneously decolorizing and degrading this toxic compounds is important. Halloysite nanotube (HNT) is proposed to have capacity for dye adsorption due to large number of nanopores. Laccase is an important enzyme that has been reported in degradation of dyes. However, there has been no report about the combination of laccase and HNT for dye removal.

The study aims to synthesis laccase-functionalized HNT (Lac-HNT) using amino acids as green crosslinkers for application of textile dye wastewater treatment. Laccase will be produced by a newly isolated fungus, *Phellinus noxius* sp. BRB 11 from Berbak-Sembilang National Park, Indonesia. The functionalization of HNT by laccase will be achieved by three step reactions: (i) providing reactive amino groups to HNT, (ii) activation with glutaraldehyde, and (iii) functionalization by the laccase through covalent bond. The Lac-HNT will be applied to degrade the synthetic dyes. Physical-chemical properties will be investigated using TEM, FE-SEM, XRD, FTIR, FTNIR, and confocal RAMAN spectroscopy to demonstrate the successful of functionalization.

Lac-HNT is proposed to be an excellent biomaterials that can be used for low-cost wastewater treatment with high capacity, stability, and reusability.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

3D Nanocellulose with Tunable Antibacterial Properties for Functional Medical Dressing

1. Research Team Leader

Name	: **ATHANASIA AMANDA SEPTEVANI, Ph. D.**
Sex	: Female
Place/Date of Birth	: Semarang, 2 September 1984
University/Institution	: National Research and Innovation Agency
Department/Faculty	: Research Centre for Chemistry
Address of Institution	: Gedung 452, Kawasan PUSPIPTEK Serpong Tangerang Selatan, Banten 15314
Phone/Fax Number	: (021) 7560929; No. Fax: (021) 7560549
Email Address	: athanasia.amanda.septevani@lipi.go.id fani.manda@yahoo.com

2. Research Field	: Material Sciences
3. Number of Researcher(s)	: 4
4. Research Location	: Kawasan PUSPIPTEK Serpong
5. Time Allocation	: 12 months
6. Research Grant	: Rp. 39,625,000.00
7. Summary of Research Proposal	:

Bacterial infection is one of the major factors to cause severe non-healing wounds affecting about 8.4 million diabetic people in Indonesia, and expected to increase to 21.3 million people by 2030. Thus, it is of particular significance to develop medical dressing that inhibits bacteria growth while maintaining moist environment to prevent dehydration, and promoting cell adhesion and proliferation.

In recent years, nanocellulose (NC)–based antibacterial materials have attracted tremendous attention due to their unique and potentially useful features. As the seriousness of drug resistance of bacteria increases rapidly, there are growing interest on developing natural antibacterial materials, including nanocellulose with advanced engineering and functionalization.

This study is aimed to develop three-dimensional (3D) NC–medical dressing with tunable antibacterial properties using active compounds from abundantly available citronella essential oil (CEO). NC is derived from oil palm empty fruit bunches using our previous protocols, then functionalized with varied fractions of active compound in CEO at different concentrations in the presence of appropriate compatibilizer for further formation of 3D structure. We expect that the 3D cross-linked NC/CEO–based medical dressing displays highly absorption properties and porous structure to decrease the need for frequent dressing replacement while achieving greater chemical-physical properties and antibacterial activity.

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Indonesia Toray Science Foundation

"RESEARCH PROPOSAL"

Elicitation of Antioxidant and Free Radical Scavenging Compounds by Riau Local Fungal Isolates, *Penicillium* – *Trichoderma* Co-Cultures using Metabolomic Investigation

1. Research Team Leader

Name	: **YUANA NURULITA, S. Si., M. Si., Ph. D.**
Sex	: Female
Place/Date of Birth	: Jakarta, 9 October 1978
University/Institution	: University of Riau
Department/Faculty	: Dept of Chemistry / Fac of Math and Sciences
Address of Institution	: Kampus Bina Widya Panam Jl. HR. Subrantas Km 12.5 Pekanbaru, Riau 28293
Phone/Fax Number	: (0761) 63273 Fax No: (0761) 63273
Email Address	: ynurulita@lecturer.unri.ac.id

2. Research Field	: Biotechnology, Natural Product, Metabolomic
3. Number of Researcher(s)	: 2
4. Research Location	: Pekanbaru, Bogor
5. Time Allocation	: January – December 2022
6. Research Grant	: Rp. 38,500,000.00
7. Summary of Research Proposal	:

Fungi of the genus *Penicillium* and *Trichoderma* harbor many biosynthetic gene clusters (BGCs) that are at the origin of many bioactive molecules with medical or industrial interests. Nevertheless, most BGCs do not express in standard lab growth conditions, preventing the full metabolic potential of these organisms from being exploited. Because it generates biotic cues encountered during natural growth conditions, co-culture is a means to elicit such cryptic compounds. Thus, this study will exhibit the potency of co-culture Riau local fungal isolates as producers of antioxidant compounds. We explore three different Riau fungal isolates, one of *Penicillium* sp. LBKURCC34 and two of *Trichoderma* sp. LBKURCC1 and LBKURCC2. As monoculture, *Penicillium* sp. LBKURCC34 has been known as a producer of antimicrobial compounds, while *Trichoderma* sp. LBKURCC1 and LBKURCC2 have been recognized as producer of industrial enzymes and bioactive compounds. These fungal isolates will be mixed double and triple fungi in liquid fermentation. After incubation, the fungal mycelium and media will be extracted by several organic solvents (acetone, ethyl acetate and butanol) and the extracts will be tested for antioxidant and free radical scavenging activity as well as metagenomic investigation using LCMS/MS to predict the difference of bioactive compounds and cryptic compound contents.

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Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Bioprospecting Thermophilic Actinobacteria Isolated from The Caldera of Mt.Tambora Volcano in Sumbawa Island for Novel Antibiotics Discovery

1. Research Team Leader

Name	:	**Dr. ALI BUDHI KUSUMA, S. Si., M. Sc., ALS.**
Sex	:	Male
Place/Date of Birth	:	Bekasi, 28 February 1988
University/Institution	:	Sumbawa University of Technology
Department/Faculty	:	Dept of Biotechnology/Fac of Biotechnology
Address of Institution	:	Sumbawa University of Technology (UTS) Main Campus, Jl. Raya Olat Maras, Desa Batu Alang, Kec. Moyo Hulu, Kab. Sumbawa, Propinsi NTB 84371
Phone/Fax Number	:	(+62) 81311988442 Fax No: -
Email Address	:	ali.budhi.kusuma@uts.ac.id

2. Research Field	:	Extremophilic Microbiology & Biotechnology, Drug Discovery
3. Number of Researcher(s)	:	2 (Including the team leader)
4. Research Location	:	1) The Caldera of Mt. Tambora Volcano, Sumbawa Island, NTB (Field work), 2) Indonesian Centre for Extremophile Bioresources and Biotechnology (ICEBB) Laboratory, Fac. Of Biotechnology, UTS & 3) Sumbawa Techno Park
5. Time Allocation	:	3 years
6. Research Grant	:	Rp. 39,300,000.00
7. Summary of Research Proposal	:	

Thermophilic actinobacteria are gaining serious attention due to their remarkable ability to synthesize a plethora of novel antibiotic compounds. Unique psychochemical and mineralogical conditions found in high temperature habitats supports the premise that harsh environmental pressures select for new organisms with the ability to produce novel antibiotics. The aims of this study are to establish the extent of thermophilic actinobacterial biodiversity in the caldera of Mt. Tambora volcano and to determine whether the novel strains have the capacities to produce new antibiotics compounds. In the first year of project, the research will be started by following these steps: sampling, selective isolation of thermophilic actinobacteria, isolates dereplication, screening for bioactivity and 16S rRNA gene sequencing analyses. Further phenotypic and whole-genome sequencing analyses will be performed to some of most promising isolates in order to determine the species' taxonomic novelty and to detect the presence of biosynthetic gene clusters associated with antibiotic production. In the year 2 and 3 of the project, the research will be continued to natural product chemistry experiment. The resultant data will provide ground-breaking information that this site is an enormous natural "storehouse" of novel actinobacterial strains that can be used to accelerate the National Antibiotics Discovery Pipeline.

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Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Investigating the Accuracy of a Simplified Treatment Planning in Molecular Radiotherapy based on One-time Point Measurement using a NLME and a PBPK Model

1. Research Team Leader

Name	: **Dr. sc. hum. DENI HARDIANSYAH**
Sex	: Male
Place/Date of Birth	: Indramayu, 31 May 1988
University/Institution	: University of Indonesia
Department/Faculty	: Dept of Physics / Fac of Mathematic and Natural Sciences
Address of Institution	: Kampus Universitas Indonesia Depok, Jl. Margonda Raya, Pondok Cina, Kecamatan Beji, Kota Depok, Jawa Barat 16424
Phone/Fax Number	: +62 812 2279 3077 Fax No: -
Email Address	: denihardiansyah@ui.ac.id

2. Research Field	: Medical Physics
3. Number of Researcher(s)	: 3
4. Research Location	: Medical Physics Laboratory, UI Depok
5. Time Allocation	: 1 years
6. Research Grant	: Rp. 40,706,400.00
7. Summary of Research Proposal	:

Personalized treatment planning in Molecular Radiotherapy for neuroendocrine tumor is time-consuming and high workload as it needs multiple imaging measurements for the calculation of the absorbed dose (AD)/time-integrated activity coefficient (TIAC). The aim of this study is to investigate the accuracy of a simplified treatment planning in Molecular Radiotherapy based on one-time point measurement using a nonlinear mixed effect (NLME) and a Physiologically-based pharmacokinetic (PBPK) model. By using one-time point measurement, treatment planning in molecular radiotherapy could be faster, cheaper and simpler. The biokinetic data of ^{111}In-DOTATATE in different organ from several patients will be collected from our colleague's hospital in Germany. The PBPK parameters are fitted using NLME method to the full time point biokinetics of ^{111}In-DOTATATE in organ at risk (OAR) and tumors to derive the reference TIACs. Calculated TIACs are derived by fitting the PBPK parameters using NLME method to the one-time measurement at different time points. The accuracy of calculated TIACs from one-time point measurement will be analyzed by calculating the relative deviations (RDs) of the calculated TIACs and reference TIACs. The optimal time point with the smallest RDs will be used as a proposed time point for Molecular Radiotherapy.

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Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Exploring Protective Genes Expressed in Shallot (*Allium cepa* L. Aggregatum-Group) against *Fusarium acutatum* as a Strategy to Develop a Climate-Resilient Crop through Ultraviolet-B Radiation System

1. Research Team Leader

Name	:	**WIDHI DYAH SAWITRI, S. Si., M. Agr., Ph. D.**
Sex	:	Female
Place/Date of Birth	:	Jember, 30 January 1986
University/Institution	:	Universitas Gadjah Mada (UGM)
Department/Faculty	:	Dept of Agronomy/Fac of Agriculture
Address of Institution	:	Jl. Flora No. 1, Bulaksumur, Kec. Depok Sleman, D.I. Yogyakarta 55281
Phone/Fax Number	:	(0274) 563062 Fax No: (0274) 563062
Email Address	:	widhi.d.s@ugm.ac.id

2. Research Field	:	Plant biochemistry, molecular biology, biotechnology
3. Number of Researcher(s)	:	3
4. Research Location	:	Faculty of Agriculture UGM (main research) & Department of Biology, University of Andalas (particially)
5. Time Allocation	:	12 months (February 2022 – February 2023)
6. Research Grant	:	Rp. 39,250,000.00
7. Summary of Research Proposal	:	

Development of climate-resilient crops is adopted to cope with biotic and abiotic stresses. Shallot (*Allium cepa* L. Aggregatum-Group) is targeted crop to be improved since it is one of the priorities for agricultural commodity in Indonesia. The challenge of *Fusarium acutatum* infection that struck shallot causes the most severe yield losses and imposes a considerable economic burden. Activation of plant protective genes through radiation of ultraviolet-B (UV-B) has attracted more concerns to contribute the plant disease prevention. Although several studies reported the regulation of UV-B induced plant defense genes, however, the mechanism in shallot remains unclear. Therefore, this study proposes to investigate the protective genes that activated in early UV-B induction with the use of reverse transcription quantitative PCR (RT-qPCR) technique. In addition, a proper dosage of UV-B exposure need to be determined to establish the application in crop protection. These combined results of UV-B treatment and molecular data analysis will support a strategy for controlling *F. acutatum* infection in shallot by taking the potential impact of climate change on UV-B expossure on earth.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

The Whole Genome Sequencing of Curcuma Longa L. as Milestone for Newly Improved Variety in Turmeric Breeding Program

1. Research Team Leader

Name	: **POPI SEPTIANI, S. Si., M. Si., Ph. D.**
Sex	: Female
Place/Date of Birth	: Kotabumi, 24 September 1984
University/Institution	: Institut Teknologi Bandung
Department/Faculty	: Department of Biology/ School of Life Sciences and Technology
Address of Institution	: Labtek XI Gedung SITH Jl. Ganeca No. 10 Bandung, West Java 40113
Phone/Fax Number	: (022) 2511575, Fax No: (022) 2534107
Email Address	: popi@sith.itb.ac.id

2. Research Field	: Genetics and Genomics
3. Number of Researcher(s)	: 2
4. Research Location	: Institut Teknologi Bandung, West Java
5. Time Allocation	: 10 months
6. Research Grant	: Rp. 39,500,000.00
7. Summary of Research Proposal	:

Indonesia as mega biodiversity country has plentiful biodiversity assets including medicinal plant species. Turmeric (Curcuma longa) is the most widely used species of curcuma genus in with high economic value as traditional medicinal plants used to treat various health problems and diseases. Turmeric's health effect is centered on its secondary metabolite in its yellow-orange rhizome called curcumin which known to have anti-inflammatory properties, providing an important role in prevention and treatment of various illnesses ranging from cancer to autoimmune, and cardiovascular diseases.

The development of superior variety with higher content of curcumin in Indonesia needs to be supported by the availability of its genetic diversity and genomics information. The limited information of its molecular marker hurdles the development of new variety. Molecular marker such as single nucleotide polymorphism (SNP) enables the selection of desired genotypes to modulate the breeding program for crop improvement.

Therefore, we aim to sequence the whole genome of Indonesia Curcuma longa using the next generation sequencing technology as milestones to future development of turmeric breeding program. The information of genomic properties obtained from whole genome sequencing will shed a light on SNP identification as molecular marker, enabling faster the development of superior varieties in breeding program.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

The potency of *Bacillus* spp. to degrade AHPND toxin protein of aquaculture pathogenic *Vibrio parahaemolyticus*

1. Research Team Leader

Name	:	**Dr. PANDE GDE SASMITA JULYANTORO**
Sex	:	Male
Place/Date of Birth	:	Tista, 26 July 1980
University/Institution	:	Udayana University
Department/Faculty	:	Dept of Aquatic Resources Management / Fac of Marine Science And Fisheries
Address of Institution	:	Jl. Raya Kampus Unud Bukit Jimbaran, Kab. Badung, Bali 80361
Phone/Fax Number	:	(0361) 702802 Fax No: (0361) 702802
Email Address	:	pande.sasmita@unud.ac.id

2. Research Field	:	Aquaculture
3. Number of Researcher(s)	:	2
4. Research Location	:	Fisheries Lab, FKP Unud
5. Time Allocation	:	8 months
6. Research Grant	:	Rp. 37,177,000.00
7. Summary of Research Proposal	:	

Early mortality syndrome (EMS) or acute hepatopancreatic necrosis disease (AHPND), is a newly emergent penaeid shrimp disease that causes serious economic losses and significant 100% mortality of both Pacific whiteleg shrimp *Litopenaeus vannamei* and black tiger shrimp *Penaeus monodon* aquaculture.

AHPND is caused by toxins secreted by pathogenic strains of *Vibrio parahaemolyticus*, that have acquired a unique 63–70 kb AHPND-associated plasmid (pVA1). This plasmid encodes the binary PirA/B^{VP} toxins that consist of two subunits PirA^{VP} and PirB^{VP}.
Consequently, the degradation of these toxins might be a valid strategy to control or mitigate AHPND. This study aimed to investigate the ability of Bacillus sp. to degrade pirA and pirB toxins produced by *V. parahaemolyticus in vitro* monitoring by SDS PAGE.

It would provide the necessary background information to run *in vivo* assays using the gnotobiotic Artemia system. In vivo challenge tests toward gnotobiotically cultured brine shrimp *Artemia franciscana* will be performed to demonstrate the potential of selected Bacillus strains to mitigate PirA and PirB toxins.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

High Reusability of Solar-heated Oil Absorbent Based-on Carbon Quantum Dots and Silver Nanoparticles for Solving Oil-spill in The Oceans

1. Research Team Leader

Name	: **Dr. ISNAENI, M. Sc.**
Sex	: Male
Place/Date of Birth	: Medan, 10 February 1978
University/Institution	: National Research and Innovation Agency
Department/Faculty	: Research Center for Physics
Address of Institution	: Building 440-442, Puspiptek, Setu, South Tangerang, Banten, 15314
Phone/Fax Number	: (021) 760-0570 Fax No: (021) 756-0554
Email Address	: isnaeni@brin.go.id isnaeniusman@gmail.com

2. Research Field	: Advanced materials
3. Number of Researcher(s)	: 3
4. Research Location	: South Tangerang
5. Time Allocation	: 6 months
6. Research Grant	: Rp. 36,416,000.00
7. Summary of Research Proposal	:

Oil-spill accidents may rarely happen in the oceans; however, once it happened, the impact was so disastrous for living creatures in the oceans. Many technologies have been applied to clean the oil-spill; unfortunately, they are still costly and time consuming. Solar-heated oil-absorbent may be the good solution. Several type of well known oil absorbents are polypyrrole-based sponges and carbon nanotube composites. However, these materials are complicated to synthesize, having low performance and difficult to mass production.

A breakthrough technology, which is non-toxic, low-cost, eco-friendly and reusable, must be developed. This becomes the great motivation to safe living creatures in the oceans. In this work, we propose a development of carbon quantum dot-based for oil absorbent. Our proposed carbon quantum dots are easily made of any carbon based materials, therefore, the synthesis and mass production of oil-absorbent can be achieved. Furthermore, we also believed that carbon quantum dots are non-toxic materials.

In this proposed work, we are going to make oil-absorbent material from carbon quantum dots with silver nanoparticles and ethylene glycol that are embedded in polyurethane sponges. Our oil absorbent is expected to perfectly work under the sun irradiation for oil cleaning.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Biosynthesis of Terpenoid and Steroid in Kaffir Lime (Citrus hystrix DC.) Callus Culture for Standardized Herbal Medicines of Breast Cancer

1. Research Team Leader

Name	:	**Dr. WORO ANINDITO SRI TUNJUNG**
Sex	:	Female
Place/Date of Birth	:	Yogyakarta, 20 July 1979
University/Institution	:	Universitas Gadjah Mada
Department/Faculty	:	Dept of Tropical Biology/Faculty of Biology
Address of Institution	:	Jl. Teknika Selatan Sekip Utara 55281 Yogyakarta 55281
Phone/Fax Number	:	(0274) 580839 Fax No: (0274) 580839
Email Address	:	wanindito@ugm.ac.id

2. Research Field	:	Biochemistry, Cellular and molecular biology, Biomedicine
3. Number of Researcher(s)	:	3
4. Research Location	:	Fac. of Biology Universitas Gadjah Mada
5. Time Allocation	:	10 hours/week
6. Research Grant	:	Rp. 38,790,000.00
7. Summary of Research Proposal	:	

Our goal is to produce high efficacy standardized herbal medicines for breast cancer from biotechnologically modified kaffir lime which can be scale up for an industrial purposes. Previous studies have shown that kaffir lime callus culture able to produce secondary metabolites in the form of terpenoids and steroids. Moreover the compounds detected are known to have a medicinal role. The objective of this study is to detect and analyze the expression level of IDI1, GPS2, GGPPS2, FPPS1, SS, and CAS1 genes in kaffir lime callus which is cultured on MS medium with addition of growth factor 2,4-D : BAP of 2:0 or 1:0.5 ppm both on G0 and G1 culture generation. This study involved callus induction from seed explant and subculture, morphology observation of callus based on callus color, texture, and biomass every 10 days for 50 days, total RNA isolation of G0 and G1 callus at the stationary phase and synthesized RNA isolates into cDNA, then continued to analyze gene expression level using RT-qPCR. Our hypothesis is Kaffir lime callus cultures are capable of expressing crucial genes in terpenoids and steroids biosynthesis, indicating their ability to produce terpenoids and steroids as well as its potency as a cancer drug.

OUTLINE OF
THE INDONESIA TORAY SCIENCE FOUNDATION

FOUNDATION HISTORY

The Indonesia Toray Science Foundation was established in 1993 through 3 billion rupiah endowment by Toray Industries, Inc. The foundation is registered with and recognized by the Indonesian authority as an organization formed to advance the objective of promoting Science and Technology in Indonesia.

FOUNDATION OBJECTIVE

The object of the foundation is to contribute to the progress of "Science and Technology" in Indonesia. Science and Technology will be limited in to the fields of natural science, including environment, but excluding clinical medicine and mathematics.

FOUNDATION ACTIVITIES

In order to achieve the objectives, the Foundation will endeavor to undertake the following activities

1. The awarding of the Science Education to recognize creative and innovative contributions to effective science education in vocational school, junior high school, senior high schools
2. The awarding of the Science and Technology, to recognize outstanding achievements in their field
3. The Science and Technology Research Grant, to provide to young scientist financial assistance for basic research in science and technology
4. All other activities related to the science

SCALE OF FOUNDATION OPERATIONS

The annual scale of operations will be approximately Rp 1 billion supplied from operating income from corporate contribution

AWARDS AND GRANTS

1. Science Education Award
2. Science and Technology Award
3. Science and Technology Research Grant

HONORARY CHAIRMAN OF ITSF (Non Board of Directors):
Mr. Akihiro Nikkaku

President of Toray Industries, Inc., Japan
Honorary Chairman of Indonesia Toray Science Foundation

BOARD OF DIRECTOR MEMBERS:

Chairman	:	**Dr. L. T. Handoko**
Managing Director	:	**Mr. Hirofusa Yamamoto**
Director	:	**Prof. Dr. Dali Santun Naga**
		Prof. Dr. Ir. Bambang Soehendro, M. Sc
		Prof. Dr. Satryo Soemantri Brodjonegoro
		Mr. Kenichi Matsui, PT. TIN

SELECTION COMMITTEE

1. The Examination Selection Committee for Science Education Award:
   - **Herwindo Haribowo, Ph. D** (chairman)
   - **Paulus Cahyono Tjiang, Ph. D** (member)
   - **Dr. Eng. Agus Haryono** (member)

2. The Examination Selection Committee for Science and Technology Award and Science and Technology Research Grant:
   - **Prof. Dr. Ir. Dedi Fardiaz, M. Sc** (chairman)
   - **Dr. Ernawati Arifin Giri Rachman** (member)
   - **Dr. M. Aziz Majidi** (member)

SUPPORTER

NO	NAME	LOCATION	DESCRIPTION
1	**TORAY INDUSTRIES, INC**	Tokyo, Jepang	Established in 1926, Toray is Japan's largest manufacturer of synthetics fiber, textiles high performance films, plastic that biggest in Japan The annual sales of ¥ 1,883.6 billion in March 2021 Toray leads the world in develop production of carbon fibers & other advanced composite materials. Building on its extraordinary technological strength, Toray is diversifiying into chemicals, pharmaceuticals, medical supplies, electronic materials, housing, and construction materials.
2	**TORAY SCIENCE FOUNDATION**	Chiba, Jepang	Toray Science Foundation established in 1960, through ¥ 1,000 million endowment by Toray Industries, Inc. to contribute to the progress of science by supporting basic research in science & technology

SUPPORTING COMPANY
TORAY GROUP INDONESIA

NO	COMPANY	LOCATION	MAIN BUSINESS
1	**PT Indonesia Toray Synthetics** (PT ITS)	Jakarta	Manufacturer of polyester staple fiber, nylon, polyester filament yarn & resin
2	**PT Indonesia Synthetics Textile Mills** (PT ISTEM)	Jakarta	Spinning, weaving, dyeing of polyester based textiles
3	**PT Acryl Textile Mills** (PT ACTEM)	Jakarta	Spinning and dyeing of acrylic fibers
4	**PT Century Textile Industries, Tbk** (PT CENTEX)	Jakarta	Spinning, weaving, dyeing of industry blended dyeing of blended polyester & cotton textiles
5	**PT Easterntex** (PT ETX)	Pandaan, Jawa Timur	Spinning, weaving of blended polyester & cotton textiles
6	**PT Toray Polytech Jakarta** (PT TPJ)	Jakarta	Nonwoven polypropilene
7	**PT TAK Textile Indonesia** (PT TATI)	Jakarta	Spinning, weaving, dyeing of polyester based textiles
8	**PT Toray International Indonesia** (PT TIIN)	Jakarta	Trading company
9	**PT TI Matsuoka Winner Industry** (PT TIMW)	Semarang	Garment