JAKARTA
TUESDAY
FEBRUARY 20,
2024

ITSF INDONESIA TORAY SCIENCE FOUNDATION

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

30th

PRESENTATION CEREMONY

THE 29th PRESENTATION CEREMONY

HOTEL MULIA SENAYAN JAKARTA, 6 MARCH 2023

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30th ITSF PRESENTATION CEREMONY

09.30 - 09.59	VVIP, Board of Directors and Selection Committee are meeting in VIP Room All the guests are waiting in Ballroom
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10.06 - 10.10	**Speech by Prof. Dr. Bambang Soehendro** Director of Indonesia Toray Science Foundation
10.11 - 10.15	**Speech by HE Mr. Yasushi Masaki** His Excellency Ambassador of Japan for Indonesia
10.16 - 10.20	**Speech by Dr. Laksana Tri Handoko** Chairman of The National Research and Innovation Agency
10.21 - 10.25	**Speech by Bapak Nadiem Anwar Makarim, B.A., M.B.A** Minister of Education, Culture, Research and Technology of Republic Indonesia
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11.10 - 11.15	Take picture (VVIP, Directors, Selection Committee & the Winners)
	Luncheon

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

Good morning.

It is a great pleasure for me as the Chairman of the Indonesia Toray Science Foundation to welcome you all in this great occasion. Please allow me, on behalf of the Board of Directors of the Indonesia Toray Science Foundation, to convey our appreciation for your presence today. Your presence is very encouraging for us, and showing you commitment to support science in general and, in particular, scientific communities in Indonesia.

ITSF, since its establishment on December 1993 by Toray Indonesia with full supports from the Ministry of Education and Culture and the Indonesian Institute of Sciences (LIPI) that time, has been aiming to contributing on the development of education and scientific research in Indonesia. Currently, Indonesia government continues supporting ITSF through the National Research and Innovation Agency (BRIN).

ITSF has established several programs to support science educators and researchers in Indonesia, in the form of research grants and scientific awards. Applications are open to all Indonesian people and are carried out transparently and competitively by independent committees consisting of leading scientists in the respected fields. This grant is intended to motivate and support researchers and educators from all over Indonesia to improve their capabilities through high quality research activities.

Please allow me to summarize the ITSF's programs this year:
1. Science Education Award for 256 educators in the fields of biology, physics, and chemistry.
2. Science and Technology Award for 27 researchers in various fields of research.
3. Research grants for 572 researchers.

As a comparison, in 2023, ITSF has awarded 9 Science Education Awards, 1 Science and Technology Award and distributed 18 Science and Technology Research Grants.

Taking this opportunity, on behalf of ITSF, I would like to congratulate all the awardees. Secondly, I would also like to express my personal appreciation to all members of Selection Committees for your hard work and dedication, and also your precious time to make those programs success.

Concluding my welcoming remark, I would like to thank the Governments of the Republic of Indonesia and Japan for their sincere support since the inception of ITSF program. I would especially like to express my deep gratitude to the Excellency Minister of Education and Culture of the Republic of Indonesia, and the Excellency Ambassador of Japan to the Republic of Indonesia.

Sincerely

Dr. L.T. Handoko

MESSAGE FROM MR. SHIGEKI TANIGUCHI
SENIOR VICE PRESIDENT OF TORAY INDUSTRIES, INC., JAPAN

On behalf of Toray Industries, Inc., Japan, I am pleased to extend my warmest wishes and greetings to you all here today on the 30th Presentation Ceremony of the Indonesia Toray Science Foundation (ITSF).

Firstly, I congratulate all the ITSF recipients who deservedly will be receiving their awards and grants today. Next, I wish to express my utmost appreciation to The Honorable Mr. Nadiem Anwar Makarim, B.A., M.B.A, Minister of Education, Culture, Research, Technology and Higher Education, Your Excellency Mr. Yasushi Masaki, the Ambassador of Japan to the Republic of Indonesia, for taking time off from your busy schedules to grace this Award Ceremony.

Toray Group, founded in 1926, is an integrated chemical industry group developing its business with operations 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, our 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, the ITSF has given awards and grants in the accumulated total amount of more than 24 billion Rupiah to 855 researchers and scientists for their outstanding achievements related to technology and science education, and for their contributions in natural science and basic research.

ITSF could not have carried out its activities successfully for 30 continuous years without the strong teamwork and earnest participation of everyone involved.

On this momentous occasion, I extend my heartfelt congratulations to the Indonesia Toray Science Foundation (ITSF) as we celebrate its 30th anniversary. Over the past 30 years, ITSF have been supporting pioneering research to nurturing young talents. Together, we have created a legacy of excellence, expanded knowledge.

I am delighted to see that the past ITSF recipients have continued to achieve brilliant results, such as receiving prestigious awards in the field of science and technology in Indonesia after ITSF award, or being appointed to an important positions as the Chairman of National Agency for Research and Innovation, like Dr. Handoko, ITSF chairman.

Our sincere appreciation to ITSF Chairman, Dr. LT. Handoko for his able leadership, the hardworking Board and Committee members, secretariat staff and all other individuals and institutions who had rendered their invaluable assistance in one way or another to the ITSF.

Once again, I would like to convey my good wishes and warmest congratulations to all the respective awards and research grants recipients. I hope that the well-deserved reward and recognition will motivate you towards accomplishing higher levels of success, while helping the Republic of Indonesia to cultivate the next generation of scientists. Please do continue with your excellent efforts year ahead.

In concluding, I also express my sincere gratitude to the Minister of Education, Culture, Research Technology and Higher Education and the Ambassador of Japan to the Republic of Indonesia for participating in today's Ceremony.

Finally yet importantly, I wish everyone all the best in your future endeavors.

Thank you very much. **"Terima Kasih".**

Shigeki Taniguchi

REPORT FROM THE SELECTION COMMITTEE FOR SCIENCE EDUCATION AWARD

Please allow me to report the process and result of the Science Education Award year 2023 or the 30th of the ITSF.

Beginning in June 2023 the ITSF has made announcements concerning the SEA Program year 2023. The announcements were by means of social media such as ITSF Website, WhatsApp, Facebook, and e-mail and it has been done several times.

On the due date of August 31st 2023, we received 94 SEA proposals. The number of the proposal has not increased significantly compared to last year. This is understandable because there are no social activities to the regions. After reviewing and evaluating the proposals, the SEA Selection Committee decided to invite 16 nominees to be interviewed for clarification, detail explanation and deep discussion regarding each science teaching innovation developed by science teacher. Among 16 selected proposals, one participant withdrew due to health condition. So, there were 15 nominees interviewed on November 10th and 11th through online Zoom meeting.

After reviewing the interview, the Selection Committee agreed to propose 9 nominees to be awarded by ITSF and approved by ITSF Board of Directors in the meeting on December 11th, 2023. The compositions of the awardees are:

Female	**: 5**	**Male**	**: 4**
Inside Java	**: 6**	**Outside Java**	**: 3**
SMP	**: 2**	**SMA**	**: 7**

Note that the Selection Committee using professional and fair criteria for reviewing, evaluating, and judging the proposals and the interview such as the correctness of the content, the applicability and easiness for classroom teaching, the originality of the innovation, the use of simple, available, and cheap materials, and the duplicability or reproducibility of the innovation.

The Science Education Awardees year 2023, in alphabetical order are:

1. **Arif Alfatah, S.Pd.Si., M.Sc.** (MA Mu'allimin Muhammadiyah Yogyakarta)
2. **Eri Teguh Kurniawan Suyatna, S.Si.** (SMPN 1 Ciasem)
3. **Erwin Saputra, S.Pd., Gr.** (SMAN 1 Talang Ubi)
4. **Fika Normayasari, S.Si.** (SMAN 1 Babadan Ponorogo)

5. Fitriyuni Miralda Siregar, S.Pd. (MAS Pembangunan Jakarta)

6. Ira Ayu Lestari, M.Sc. (SMA Bukit Asam Tanjung Enim)

7. John Elton Ngarbingan, S.Pd., Gr. (SMAN 5 Tual)

8. Luh Murniasih, M.Pd. (SMAN 3 Malang)

9. Tia Jannah Tertia, S.Pd. (SMP Laboratorium Percontohan UPI)

We congratulate to the awardees with the hope that you all continue to innovate and encourage your colleague teachers to innovate their science teaching.

Thank you.

Jakarta, 20 February 2024

Science Education Award Selection Committee:
- **Herwindo Hariwibowo, Ph.D. (Chairman)**
- **Prof. Dr. Eng. Agus Haryono (Member)**
- **Paulus Cahyono Tjiang, Ph.D. (Member)**

REPORT FROM THE SELECTION COMMITTEE 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 30th Science and Technology Award (STA) and the 30th Science and Technology Research Grant (STRG). In addition, I would like also to report the ITSF Science and Technology Seminar carried out on-line on January 31, 2024.

Science and Technology Award

The ITSF Selection Committee received 20 nominations for Science and Technology Award program from 16 universities, and 4 research institutes (BRIN) this year. After having 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 ITSF Selection Committee selected and invited three candidates for face-to-face interview assessment.

After carefully evaluating the portfolios of the three candidates and interviewing them, the ITSF Selection Committee found that Prof. Dr. Diana Elizabeth Waturangi from Atma Jaya Catholic University was the candidate who fulfilled the ITSF criteria for the STA Winner. We were convinced that her approach to combat food-borne and aquaculture pathogenic bacteria and their biofilms using antibiofilm and bacteriophages was the correct one and has been successfully achieved. The Selection Committee considered her achievement was a breakthrough, and therefore it was decided to select Prof. Dr. Diana Elizabeth Waturangi as the STA winner. Congratulation to Prof. Diana for her continuous and consistent effort in reaching these achievements to improve food safety. The ITSF Selection Committee expects and encourages more scientists to be nominated for STA program next year.

Science and Technology Research Grant

As many as 327 research proposals were received nationwide for Science and Technology Research Grant. ITSF received 180 proposals from universities and 147 proposals from research institutes. ITSF will provide the total grant of Rp. 705,000,000 to 18 research proposals this year, as indicated in the following table.

The ITSF 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.

List of Science and Technology Research Grant Recipients

No	NAME	UNIVERSITY/RESERACH INSTITUTE	GRANT APPROVED (IDR)
1	**Ardi Wiranata, S.T., M.Eng., Ph.D.**	Universitas Gadjah Mada	39,500,000
2	**Ferry Anggoro Ardy Nugroho, B.Eng., M.Sc., Ph.D.**	Universitas Indonesia	39,500,000
3	**Dr. Ni Luh Wulan Septiani**	National Research and Innovation Agency (BRIN)	37,535,580
4	**Dr. Robby Roswanda**	Institut Teknologi Bandung	39,500,000
5	**Dr. Eng. Wahyu Ramadhan**	Institut Pertanian Bogor	39,172,500
6	**Katherine, Ph.D.**	Indonesia International Institute for Life Sciences	36,822,500
7	**Dwi Ariyanti, Ph.D.**	Universitas Teknologi Sumbawa	35,837,680
8	**Dr. Muhandis Shiddiq, S.Si, M.Sc.**	National Research and Innovation Agency (BRIN)	39,500,000
9	**Robertus Wahyu Nayan Nugroho, Ph.D.**	National Research and Innovation Agency (BRIN)	39,872,500
10	**Karlia Meitha, Ph.D.**	Institut Teknologi Bandung	38,917,580
11	**Dr. Fahrizal Yusuf Affandi**	Universitas Gadjah Mada	39,972,500
12	**Retno Agnestisia, S.Si., M.Sc., Ph.D.**	Universitas Palangka Raya	39,500,000
13	**Siti Eka Yulianti, M.Si.**	National Research and Innovation Agency (BRIN)	37,472,500
14	**Dr. Sasfan Arman Wella**	National Research and Innovation Agency (BRIN)	37,500,000
15	**Pramesti Istiandari, S.T., M.Eng., Ph.D.**	Indonesia International Institute for Life Sciences	41,072,000
16	**Dr. Ariel Pradipta, M.Res., Ph.D.**	Universitas Indonesia	41,169,580
17	**Ata Aditya Wardana, S.TP., M.Si., Ph.D.**	Bina Nusantara University	41,687,500
18	**Dr. Dwi Haryanti, S.Kel., M.Sc.**	Universitas Diponegoro	40,467,580
TOTAL			**705,000,000**

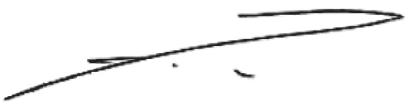
Science and Technology Seminar

The ITSF Selection Committee would like also to report that the ITSF Science and Technology Seminar was carried out on-line successfully on January 31, 2024. As many as 18 recepients of the Science and Technology Research Grant year 2022 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, the Seminar participants had opportunity to listen to Prof. Diana, as the STA Winner for sharing her experience in studying biofilm. 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 ITSF 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 challenging assignment.

Finally I conclude the report of the ITSF Selection Committee for Science and Technology Year 2023 and thank you very much for your kind attention.

Jakarta, February 20, 2024
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
30th PROGRAM - 2023

NO	NAME	TITLE	AMOUNT
1	**Arif Alfatah, S.Pd.Si., M.Sc.** MA Mu'allimin Muhammadiyah Yogyakarta DI Yogyakarta Physics	Triangle Mekanik Multifunctional Demonstration / Practicum in Physics Learning, the Subject of Friction	25.000.000
2	**Eri Teguh Kurniawan Suyatna, S.Si.** SMPN 1 Ciasem West Java Biology	The Effectiveness of the Use Of Magister Mendel Props in Improving Understanding of the Concept of Inheritance of Monohybrid Traits in Class IX SMPN 1 Ciasem	25.000.000
3	**Erwin Saputra, S.Pd., Gr.** SMAN 1 Talang Ubi South Sumatera Biology	ALGASAFIRATICON (Ascon-Type Phylum Porifera Water Canal Teaching Aid)	25.000.000
4	**Fika Normayasari, S.Si.** SMAN 1 Babadan Ponorogo East Java Chemistry	The Ionic Compound Clock (ICC)	25.000.000
5	**Fitriyuni Miralda Siregar, S.Pd.** MAS Pembangunan Jakarta DKI Jakarta Chemistry	Eco-Friendly Batik Art: Exploring Acid-Base Chemistry for Natural Tie-Dye	25.000.000
6	**Ira Ayu Lestari, M.Sc.** SMA Bukit Asam Tanjung Enim South Sumatera Biology	Cell-mulation: A Simulation Games about Cells to Improve Student's Understanding about Protein Synthesis	25.000.000
7	**John Elton Ngarbingan, S.Pd., Gr.** SMAN 5 Tual Maluku Biology	Differentiated Learning Innovation to Create Merdeka Belajar	25.000.000
8	**Luh Murniasih, M.Pd.** SMAN 3 Malang East Java Chemistry	The Implementation of Kurikulum Merdeka with the LOVED Strategy and Media Adventures of Si KIMJU in Learning Green Chemistry	25.000.000
9	**Tia Jannah Tertia, S.Pd.** SMP Laboratorium Percontohan UPI West Java Physics	Stylized Cube: A Tool to Understand the Resultant Force Acting on the Cube Placed on the Table	25.000.000
TOTAL			**225.000.000**

INDONESIA TORAY SCIENCE FOUNDATION
SCIENCE AND TECHNOLOGY AWARD'S RECIPIENT
30th PROGRAM - 2023

NO	NAME	TITLE	AMOUNT
1	**Prof. Dr. Diana Elizabeth Waturangi** Universitas Katolik Indonesia Atma Jaya	Combating Food-borne and Aquaculture Pathogenic Bacteria and Their Biofilms Using Antibiofilm and Bacteriophages	100.000.000

INDONESIA TORAY SCIENCE FOUNDATION
SCIENCE AND TECHNOLOGY RESEARCH GRANT'S RECIPIENTS
30th PROGRAM - 2023

NO	NAME	RESEARCH TITLE	AMOUNT	FUNDED BY
1	**Ardi Wiranata, S.T., M.Eng., Ph.D.** Gadjah Mada University	Development of Low-Hysteresis and High Reliability Stretchable Conductive Materials using Rapid Prototyping Method for Wearable Devices	39.500.000	Toray Science Foundation Japan
2	**Ferry Anggoro Ardy Nugroho, B.Eng., M.Sc., Ph.D.** University of Indonesia	Shedding Light on the Electrochemical Process: Operando Optical Tracking of Hydrogen Evolution Reactions in Model Oxide Thin Films	39.500.000	Toray Science Foundation Japan
3	**Dr. Ni Luh Wulan Septiani** National Research and Innovation Agency (BRIN)	Bimetallic Metal Organic Framework for Highly Sensitive and Selective Dengue Virus Electrochemical Biosensor	37.535.580	Toray Science Foundation Japan
4	**Dr. Robby Roswanda** Institute of Technology Bandung	"Modified Isolonchocarpin via Photoisomerization and Photocyclization as a Precursor of Aromatic O-heterocycle-based Photosensitizer"	39.500.000	Toray Science Foundation Japan
5	**Dr. Eng. Wahyu Ramadhan** IPB University	Constructing Oleogel-Structured Emulsion (OGE) in Surimi Analogues Product Containing Omega-3 LCFAs to Support Long-Term Bioavailability and Precise Nutritional Intervention: In Vitro Evaluation	39.172.500	Toray Science Foundation Japan
6	**Katherine, Ph.D.** Indonesia International Institute for Life Sciences	Development of Red Fruit Oil Co-crystal with Different Sugar Substitute as a Potential Healthier Food Colorant Alternative in Aqueous Food System	36.822.500	Toray Science Foundation Japan
7	**Dwi Ariyanti, Ph.D.** Universitas of Technology Sumbawa	Unravel the Potential of Biosynthetic Gene Cluster from Soil-derived Actinobacteria of Sumbawa Island, Indonesia	35.837.680	Toray Science Foundation Japan
8	**Dr. Muhandis Shiddiq, S.Si, M.Sc.** National Research and Innovation Agency (BRIN)	Nanoparticle-Enhanced Laser Induced Breakdown Spectroscopy for Rapid and Sensitive Determination of Heavy Metal Content in Foods	39.500.000	Toray Science Foundation Japan

9	**Robertus Wahyu Nayan Nugroho, Ph.D.** National Research and Innovation Agency (BRIN)	Modified Chitin Nanocrystals as a Glucose Sensing Device (MOCHINTOSE)	39.872.500	Toray Science Foundation Japan
10	**Karlia Meitha, Ph.D.** Institute of Technology Bandung	Deletion of miRNA 2059 Gene from Chili (Capsicum annuum) by CRISPR/Cas9 Genome Editing to Improve Tolerance to Pathogens	38.917.580	Toray Science Foundation Japan
11	**Dr. Fahrizal Yusuf Affandi** Gadjah Mada University	Application of active-Modified Atmosphere Packaging (a-MAP) based on Oxygen Absorber to reduce Chilling Injury (CI) in Tomatoes (Solanum Lycopersicum)	39.972.500	Toray Science Foundation Japan
12	**Retno Agnestisia, S.Si., M.Sc., Ph.D.** University of Palangka Raya	Eco-friendly and High-Performance Biocatalyst for Textile Dye Waste Removal: Laccase Immobilization on Magnetic Fe3O4@Cellu@UiO-66 Nanocomposite	39.500.000	Toray Science Foundation Japan
13	**Siti Eka Yulianti, M.Si.** National Research and Innovation Agency (BRIN)	Development of Neoagarooligosaccarides β-agarase from Streptomyces sp. Isolated from Marine Sediment as A Novel Skin Whitening and Moisturizing	37.472.500	Toray Science Foundation Japan
14	**Dr. Sasfan Arman Wella** National Research and Innovation Agency (BRIN)	Impact of Graphene Edges on Stability and Performance of Dual-atom Catalyst (XY=Fe,Mn)-N6 for Oxygen Reduction Reaction: A combined DFT, Machine Learning, MD, and Microkinetic Study	37.500.000	Toray Science Foundation Japan
15	**Pramesti Istiandari, S.T., M.Eng., Ph.D.** Indonesia International Institute for Life Sciences	Unveiling High-Value Triterpenoid Biosynthesis in Medicinal Legume Abrus Precatorius through Transcriptomic Analysis and Methyl Jasmonate Treatment	41.072.000	ITSF
16	**Dr. Ariel Pradipta, M.Res., Ph.D.** University of Indonesia	Changes of High Sensitive-C Reactive Protein and Inflammatory Cytokines in Elderly Coronary Artery bypass Surgery Patients Hospitalized in ICU	41.169.580	ITSF
17	**Ata Aditya Wardana, S.TP., M.Si., Ph.D.** Bina Nusantara University	Investigation of Quality and Safety Improvements in Traditional Food Products via Nanocomposite Coatings on Packaging Made from Indonesian Indigenous Leaves	41.687.500	ITSF
18	**Dr. Dwi Haryanti, S.Kel., M.Sc.** Diponegoro University	Understanding the Microbiome of Atramentous Necrosis Disease (AN) Infected Coral Species in Alang-alang Water, Karimunjawa, Indonesia	40.467.580	ITSF
TOTAL			**705.000.000**	

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Triangle Mekanik Multifunctional Demonstration/Practicum in Physics Learning, the Subject of Friction

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

Name	: **ARIF ALFATAH**
Sex	: Male
Place/Date of Birth	: Sragen, 1st of August 1982
School	: MA Mu'allimin Muhammadiyah Yogyakarta
School Address	: Jl. S. Parman No. 68 Wirobrajan Yogyakarta, DI Yogyakarta 55012
Phone/Fax Number	: (0274) 373-122 No. Fax: (0274) 385-516
Email Address	: arifalfatah1982@gmail.com

3. **Proposal Summary** :

This teaching aid demonstration/practicum which named by the Triangle Mechanic can be used in studying physics about friction. There are four demonstration/practicum models that can be applied, they are work-energy theorem, determining quantities that influence the friction force, measuring the static friction coefficient, and measuring the friction force on various surfaces.

All materials that used were exiting materials around the house, such as wood, plywood, zinc aluminum, glass, rubber tires, string, and Pocari Sweat drink bottles. Meanwhile, other tools that used to support are time measuring tools/stopwatch.

The innovation of this teaching aid is related to the use of inclined planes of right triangles and the natural attraction of gravity, which is more precise in measurements, replacing human attraction force. The surface of the planes is replaced with various different materials (wood, aluminum zinc, glass and rubber), thus we get a various of surfaces roughness of objects.

In terms of use, it is very easy and not complicated, while in terms of manufacturing it is very easy to imitate/duplicate. Consequently, the application of the Triangle Mechanic teaching aid through demonstration method has a very positive impact on students in learning physics.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

The Effectiveness of the Use Of "Magister Mendel" Props in Improving Understanding of the Concept of Inheritance of Monohybrid Traits in Class IX SMPN 1 Ciasem

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

Name	: **ERI TEGUH KURNIAWAN SUYATNA, S.Si.**
Sex	: Male
Place/Date of Birth	: Subang, December 08, 1981
School	: SMPN 1 Ciasem
School Address	: Jl. Jenderal Achmad Yani No.14 Ciasem Girang Kec. Ciasem Kab.Subang Propinsi Jawa Barat Post Code: 41256
Phone/Fax Number	: (0260) 520112 Fax No: -
Email Address	: stemipa21@gmail.com

3. **Proposal Summary** :

This work discusses the effectiveness of the use of MAGISTER MENDEL teaching aids in increasing understanding of the inheritance of traits (Mendel's Law) for grade IX students at SMP Negeri 1 Ciasem Kab. Subang. Mendel's Law is one of the materials that is considered difficult and abstract by students, so it requires the help of props so that this concept becomes more concrete. Magister Mendel is an acronym for Main Geser Stik Es Krim Mendel Law. These props are made with used goods that are easily obtained by students and can be imitated by all teachers in Indonesia such as plywood/cardboard, ice cream sticks, color markers/dyes, fox glue, and cutters.

Students will learn and play using these props to aid understanding the concept of inheritance of traits. If the problem of inheritance of traits is about dominant and recessive, then students shift the stick to the right or left in full. Meanwhile, if the problem of inheritance of traits is, about intermediate, then students will shift the stick to the middle of the hole, which indicates the emergence of new traits. Learning will feel interesting, challenging and concrete, so the expected result is an increase in student motivation and learning outcomes.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

ALGASAFIRATICON
(ASCON-TYPE PHYLUM PORIFERA WATER CANAL TEACHING AID)

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

Name	: **ERWIN SAPUTRA, S.Pd., Gr.**
Sex	: Male
Place/Date of Birth	: Aek Nabara, 31 October 1986
School	: SMA Negeri 1 Talang Ubi
School Address	: Jl. Beringin Talang Subur, Talang Ubi, Penukal Abab Lematang Ilir (PALI) South Sumatra Post Code 31211
Phone/Fax Number	: (0713) 390179) Fax No: (0713) 390179
Email Address	: erwinsaputra10@guru.sma.belajar.id atau erwindzakiyya@gmail.com

3. **Proposal Summary** :

The Phylum Porifera belongs to the Invertebrate group of the Animalia Kingdom, the Biology material on Biodiversity sub-Taxonomy theme learned in tenth grade. Its body consists of eukaryotic cells, diploblastic, porous, lives in seawater and freshwater, and has water canals to absorb dissolved nutrients. The three types of water canals are Ascon, Sycon, and Rhagon. Without teaching aids, the water canal material becomes abstract and challenging for students to understand. So, created it called ALGASAFIRATICON. The Ascon-type water canal was chosen because it is easy to make. The teaching aids utilize waste (cardboard and plastic bottles), hoses, betadine (providone-iodine) solution (contains brick red iodine as an analogy for nutrient fluids dissolved in the environment), and orange extract (contains ascorbic acid, which functions as a neutralizer for the iodine reaction in the solution betadine so that the brick red color changes to clear indicating that the nutrients have been absorbed). The teaching aid is equipped with a QR code created using canva so that more practical to access the material presented in the form of handouts, YouTube, Students' Worksheets, and Operational Standards for Use. Even though the teaching aid is simple, it is beneficial in improving student learning outcomes and motivation.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

The Ionic Compound Clock (ICC)

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

Name	: **FIKA NORMAYASARI, S.Si.**
Sex	: Female
Place/Date of Birth	: Madiun, 9th July 1984
School	: State Senior Hight School 1 Babadan
School Address	: Street. Fisheries, Pondok Village, Ponorogo Post Code: 63491
Phone/Fax Number	: 082142407694 Fax No: -
Email Address	: pikapikachu9784@gmail.com

3. **Proposal Summary** :

The Ionic Compound Clock (ICC) is a tool for studying the chemical formulas of ionic compounds. The Ionic Compound Clock (ICC) is a tool for learning the naming of ionic compounds. Chemical formulas for ionic compounds and aming ionic compounds are abstract topics. Many students have difficulity understsnding the chemical formulas of ionic compounds and naming ionic compounds. The students use Ionic Compound Clock (ICC) to study the chemical formula for ionic compounds and the naming of ionic compounds. The students find it very helpful in learning chemical formulas and naming ionic compounds. The students find it very easy to lesrn chemical formulas and naming ionic compounds.

After the students use the Ionic Compound Clock (ICC), obtained test results for the level of understanding of chemical formulas for ionic compounds from 36 students are as follows: (i). students who get a score of (95 - 100) are 10 students. (ii). students who get a score of (90-94) are 6 students. (iii). students who get a score of (85-89) are 10 students. (iv). students who get a score of (80-84) are 8 students. (v). students who get a score of (75-79) are 2 students.

After the students use the Ionic Compound Clock (ICC), obtained test results for the level of understanding of naming ionic compounds from 36 students are as follows: (i). students who get a score of (95-100) are 8 students. (ii). students who get a score of (90-94) are 8 students. (iii). students who get a score of (85-89) are 12 students. (iv). students who get a score of (80-84) are 7 students. (v). students who get a score of (75-79) are 1 student.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Eco-Friendly Batik Art: Exploring Acid-Base Chemistry for Natural Tie-Dye

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

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3. **Proposal Summary** :

Acid-base indicators play an important role in introducing the nature of acid-base solutions. In fact, acid-base solutions cannot be known by their nature only by sensing with the tongue, touching with hands, or with other sensory organs. Making Eco-Friendly Batik Tie-Dye as a visual indicator method for explaining the concept of acid-base in learning. Students are introduced to local wisdom through the art of traditional Indonesian batik.

The Eco-Friendly Batik Tie-Dye innovation integrates the art of batik with acid-base chemistry learning. Through the color change of the fabric, students visually understand the concept of pH change in depth. This approach stimulates creativity, creates an engaging and effective cross-disciplinary learning experience, encourages active participation, preserves Indonesian culture, and teaches the concept of protecting the environment in a sustainable way.

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Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

"Cell-mulation": A Simulation Games about Cells to Improve Student's Understanding about Protein Synthesis

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

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3. **Proposal Summary** :

Biology is sometimes identic with lots of recitation (memorization), summaries, foreign terms that is mostly unfamiliar for students. In addition, most of the terms are quite similar, such as DNA-RNA, mitosis-meiosis, transcription-translation- mRNA-tRNA, and many more. Furthermore, most of the learning medias shown on the screen (projector) are full of words making it harder for students to understand and be interested in the learning process itself. This is what underlying the needs of student's activity in class to improve their interest and understanding about the material in a creative way.

Cell-mulation is a simulation game with the purpose of improving student's understanding about protein synthesis. On this simulation game, class is divided into 2-3 big groups (depending on the total students in class), where each group will be divided again into smaller groups where each member has a role as organelles inside the cell. Each person has its own role in a group, whether transcripting DNA or translating it to produce the amino acid chain.

This fun game is so easy to applied in class because its only need a simple paper and amino acid table. It can also be modified according to teacher and student's needs in class. With cell-mulation game, students can learn the material, actively moving (not boring) and also practicing their teamwork in class.

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"AWARDING PROPOSAL"

Differentiated Learning Innovation to Create Freedom of Learning

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

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3. **Proposal Summary** :

Learning that has been carried out so far has not responded to the diverse learning needs of students, resulting in various problems experienced by students, including low motivation to learn. The purpose of this work is to accommodate students' learning needs based on students' learning readiness, interests and learning profiles (learning styles: visual, auditory, and kinesthetic).

Differentiated learning is implemented through 3 stages, namely (1) Planning: creating teaching modules with 3 differentiation strategies (2) Implementation: implementation of learning by applying content differentiation through showing the covid-19 pandemic video, finding information about viruses through textbooks and accessing the internet and SMA Biology applications. Process differentiation is applied through question-and-answer discussions and practicum. Product differentiation is applied through the creation of various products related to covid-19 prevention according to the interests and talents of students, the products produced are: videos, posters, poems, songs, paintings, papers, masks and others. (3) Evaluation: the application of the differentiation concept provides a meaningful learning experience; students feel very happy and enthusiastic about participating in the learning process.

The implementation of differentiated learning has an impact on increasing knowledge, motivation, character, and interests and talents. Students who have been silent in class, through differentiated learning become active in groups and complete independent assignments given to them.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

The Implementation of Kurikulum Merdeka with the "LOVED" Strategy and Media Adventures of Si KIMJU in Learning Green Chemistry

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

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3. **Proposal Summary** :

The LOVED strategy is an innovative strategy that can be used in the differentiated learning process. This strategy consists of five activities: Listen, Organize, Verify, Execute, and Deploy. Si KIMJU's adventure media is simple board games about green chemistry. Uniquely, the pieces in this game consist of visual, auditory, and kinesthetic. The advantages of this combination of innovative strategies and media are that it is original, easy to implement, based on the principles of kurikulum merdeka, student-centered, project-based, and has an impact on students and their environment.

Green chemistry learning begins with cognitive and non-cognitive diagnostic assessments. Next, students form groups according to their learning style to explore the 12 principles of green chemistry. The concept verification process was carried out through the Si KIMJU adventure game.

In the Execute stage, each group can apply one of the principles of green chemistry, such as making bioplastics, aromatherapy candles, etc. Finally, students disseminate information both offline and online.

This strategy makes green chemistry learning, more meaningful and impactful. Apart from that, students' understanding of the material is in a good category, with a class average score of 85.00. Thus, these innovative strategies and media are effectively used in learning green chemistry.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

"Stylized Cube": A Tool to Understand the Resultant Force Acting on the Cube Placed on the Table

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

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3. **Proposal Summary** :

In physics, force is a vector quantity, so it has both the magnitude and direction associated with it. Many students in junior high school level partially understand this essential concept indicated by ignoring the direction of the force. Therefore, assisting students in learning is crucial to overcoming this concept obstacle. The innovation, named 'kubus bergaya' was built to bring the force resultant as an abstract concept to real phenomena in the learning process. Although the force resultant is described quantitatively, this tool comprehensively brings the force as a vector quantity.

Trial and error occurred in the learning process to balance the cube on the table. This chaotic activity happened due to the various objects as a force (weight) selected by the student to put the cube in an equilibrium position. Despite the chaos in the students' first trial, the learning reflection shows that the students could identify that the force had the magnitude and the direction shown by their ability to balance the cube and explain the concept behind it.

ITSF
Indonesia Toray Science Foundation
"AWARDING PROPOSAL"

Combating Food-borne and Aquaculture Pathogenic Bacteria and Their Biofilms Using Antibiofilm and Bacteriophages

2. Receiver

Name	: **Prof. Dr. DIANA ELIZABETH WATURANGI**
Sex	: Female
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3. Proposal Summary :

Foodborne pathogens are the main challenges to Food safety. For more than twenty years we studied on their prevalence; genetic diversity; antibiotic resistance and their virulence genes. Beside that, we also concerned on pathogens in aquaculture for food security issues.

These pathogens produce biofilm, as their survival strategies in the environments. Treatment using antibiotics increase the burden of antibiotic resistance. On the other hand, excessive use of chemical preservative in food might cause side effect to human health. The important thing both antibiotic and chemical preservative difficult to control biofilm. Therefore, exploration of biocontrol as an alternative approach are important.

We found metabolite of actinomycetes and phyllosphere bacteria capable to control biofilm of various foodborne and aquaculture pathogens. The compound and antibiofilm mechanism have been identified. Regarding pathogens in aquaculture, in vivo studies showed survival rate and immunity improvement in various fish.

Beside approach using antibiofilm, we have done exploration of bacteriophage to control pathogens and biofilms, these phage are capable to control pathogens and the biofilms. Whole genome sequencing of the phage have been determined, it is confirm as lytic, no antibiotic resistance and virulence genes. Hence, it is consider safe to be used for further applications.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Development of Low-Hysteresis and High Reliability Stretchable Conductive Materials using Rapid Prototyping Method for Wearable Devices

1. Research Team Leader

Name	: **ARDI WIRANATA, S.T., M.Eng., Ph.D.**
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2. Research Field	: Soft material (stretchable sensor)
3. Number of Researcher(s)	: 3
4. Research Location	: Departemen Teknik Mesin dan Industri, Universitas Gadjah Mada
5. Time Allocation	: 12 Months
6. Research Grant	: Rp. 39,500,000
7. Summary of Research Proposal	:

Soft robotics gained much attention due to the capabilities of a wide range of movement, high degree of freedom, and wearability. Soft robots consist of soft sensors and actuators. Soft and stretchable sensors have potential in wearable devices, for example, to detect human motion, health monitoring, and wearable humidity monitoring. High-performance stretchable sensors should be stable and reliable. Reliable stretchable sensors can preserve their sensitivity while sustaining large deformations and durability for millions of cycles. Many researchers have reported rapid prototyping of stretchable sensors using pad printing, Supersonic cluster beam, Langmuir Schaefer, and CNT-Silicone composite. However, this method requires specialized equipment and specific skills to operate the equipment. In this research, we aim to simplify the fabrication methods of stretchable sensors by using a commercialized additive manufacturing process. These types of manufacturing processes include FDM and SLA. The challenge of these methods is the end product. Usually the stretchable material produced by using FDM and SLA is less stretchable and has high hysteresis. To overcome these problems, we perform both material modifications and review the material pattern. We expect our methods can contribute to the simple and reliable fabrication methods for stretchable sensors.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Shedding Light on the Electrochemical Process: Operando Optical Tracking of Hydrogen Evolution Reactions in Model Oxide Thin Films

1. Research Team Leader

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2. Research Field : Energy materials
3. Number of Researcher(s) : 2
4. Research Location : Departemen Fisika UI
5. Time Allocation : 1 year
6. Research Grant : Rp. 39,500,000
7. Summary of Research Proposal :

This research aims to build a low-cost spray deposition technique and develop a novel, in situ, optical characterization of electrochemical processes. The research is motivated by the need to establish (i) a low-cost thin metal oxide film fabrication method and (ii) a low cost yet powerful characterization technique to study material evolution during reactions. Establishing such a method will lead to intimate understanding between optical and electrochemical properties of materials; therefore, speeding up the development in such vibrant materials with emerging applications in e.g. energy generation and storage. On a local scale, our open information strategy will immensely benefit Indonesia's universities and institutes working in materials science research.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Bimetallic Metal Organic Framework for Highly Sensitive and Selective Dengue Virus Electrochemical Biosensor

1. Research Team Leader

Name	: **DR. NI LUH WULAN SEPTIANI**
Sex	: Female
Place/Date of Birth	: Bandung, 17 September 1990
University/Institution	: National Research and Innovation Agency
Department/Faculty	: Research Center for Advanced Materials
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2. Research Field	: Nanomaterials for Biosensor
3. Number of Researcher(s)	: 4
4. Research Location	: Research Center for Advanced Materials
5. Time Allocation	: 12 months
6. Research Grant	: Rp. 37,535,580
7. Summary of Research Proposal	:

As tropical country, Indonesia suffers from the rapid spread of Dengue Virus especially in humid conditions of rainy season. With the condition, many infected cases even death cases caused by this virus have been reported. Therefore, DENV detection in human body in early stage need to be realized to prevent the death. In this project, development of bimetallic copper-cobalt metal organic frameworks as an electrode modifier as well as matrix immobilization of DENV-3 antibody for electrochemical DENV biosensor is proposed. High performance of biosensor can be achieved by this strategy where high surface area owned by the MOF provides abundant site for antibody immobilization improving its sensitivity and selectivity. In addition, the synergistic effect of two metal nodes is believed to improve electrocatalytic activities and conductivity compared to a single metal MOFs. In this project, bimetallic MOFs will be prepared using simple co-precipitation method with triethanolamine as a pH modulator at room temperature. The sensing performance will be evaluated using cyclic voltammetry (CV) and different pulse voltammetry (DPV) techniques. In this project, sensitivity, linear range, and limit detection will be determined.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

"Modified Isolonchocarpin via Photoisomerization and Photocyclization as a Precursor of Aromatic O-heterocycle-based Photosensitizer"

1. Research Team Leader

Name	:	**DR. ROBBY ROSWANDA**
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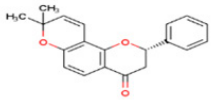
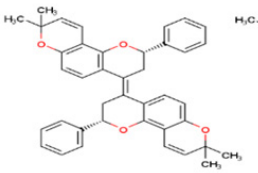
2. Research Field	:	Organic Chemistry
3. Number of Researcher(s)	:	1
4. Research Location	:	ITB Ganesha Bandung Campus
5. Time Allocation	:	6 Months
6. Research Grant	:	Rp. 39,500,000
7. Summary of Research Proposal	:	

Secondary photochemical reaction such as energy transfer from photosensitizers (PS) to other molecules has been utilized by both biological systems and synthetic ones in order to access metastable states that are kinetically unfavoured. The application of PSs in health and energy sector encourages scientists to conduct numerous research on PSs through synthesis, semisynthesis, or isolation of natural products. Synthetic PSs are usually through many reaction purification steps and utilizes transition metals efficient to obtain the desired properties. Hence, new methods to obtain PSs are needed that are more efficient and environmentally friendly. One alternative to shorten the synthetic route is to use building blocks that are available in nature such as flavanones isolated from Tephrosia vogelii. McMurry reaction towards one of the flavanones, (-)-isolonchocarpin, can result in overcrowded alkene 1. Dehydrogenation of 1 to generate 2 can increase its aromaticity that will be crucial for its role as photosensitizers. The next step is photoisomerization of trans-2 to cis-2 followed by its photocyclisation is expected to produce 3 that can potentially be applied as a PS or its precursor. The goal is to develop photosensitizers from building blocks provided from sustainable resources such as Indonesian natural products.



(-)-isolonchocarpin



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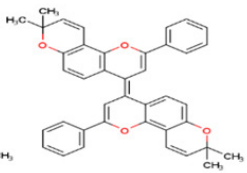

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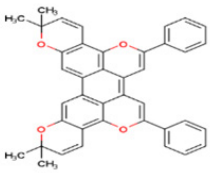

3

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"RESEARCH PROPOSAL"

Constructing Oleogel-Structured Emulsion (OGE) in Surimi Analogues Product Containing Omega-3 LCFAs to Support Long-Term Bioavailability and Precise Nutritional Intervention: In Vitro Evaluation

1. **Research Team Leader**

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2. Research Field	:	Food
3. Number of Researcher(s)	:	2 (including the principal investigator and co-investigator)
4. Research Location	:	Bogor
5. Time Allocation	:	1 Year (February-December 2024)
6. Research Grant	:	Rp. 39,172,500
7. Summary of Research Proposal	:	

The traditional perspective asserts that a high intake of long-chain fatty acids (LCFA) in food is sufficient to ensure an adequate supply of omega-3 fatty acids, thus maintaining human health and preventing diseases. However, various factors such as bile secretion and intestinal pH can trigger significant environmental changes along the gastrointestinal tract, potentially affecting the absorption of essential fatty acids. Additionally, surimi-based products experience nutrient losses, particularly in omega-3 fatty acids due to their washing process. Hence, the current study aims to assess the construction of an oleogel-structured emulsion (OGE) to preserve omega-3 content, prevent deterioration, and mitigate adverse effects within the human digestive tract. The OGE system will be analyzed using several parameters, including rheology, oil binding capacity, emulsion stability, differential scanning calorimetry, and crystallinity index. Subsequently, the system of OGE will be evaluated using in vitro release testing in simulated intestinal and gastric fluid. Two models will be employed: one involving LCFA omega-3 incorporation within the OGE system, and the other using direct omega-3 incorporation into surimi as a control. The in vitro evaluation will be conducted using several models of kinetic release profiles, aiming to measure the enhancement of bioavailability and achieve precise omega-3 delivery.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Development of Red Fruit Oil Co-crystal with Different Sugar Substitute as a Potential Healthier Food Colorant Alternative in Aqueous Food System

1. Research Team Leader

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2. Research Field	:	Functional Food, Particle Engineering
3. Number of Researcher(s)	:	2
4. Research Location	:	Indonesia International Institute for Life Sciences
5. Time Allocation	:	10 months
6. Research Grant	:	Rp. 36,822,500
7. Summary of Research Proposal	:	

The goal of this study is to develop co-crystal Red Fruit Oil (RFO) as a natural food colorant for aqueous applications by utilizing alternative sugars (xylitol, dextrose, and erythritol). The objectives include optimizing the co-crystallization process, characterization of physicochemical parameters, and evaluation of viability in aqueous food systems. The hypotheses propose that alternative sugars are effective co-crystallization conformers, that co-crystal RFO has desirable qualities, and that it is stable in aquatic conditions. The methodology involves preparing co-crystal RFO using solvent evaporation followed by cooling, morphological characterization with SEM, physicochemical characterization with FTIR, XRD and DSC, total carotenoid content, alpha and beta carotenoid content, moisture content, and hygroscopicity. The cocrystal performance will be characterized for its color, flowability, solubility, lipid peroxide value, creaming index, pH stability, total carotenoid content stability. The work advances science and technology by proposing a novel method for increasing RFO's solubility and stability, thus expanding its potential as a natural colorant, sweetener, and antioxidant source. This study pioneers a healthier and more versatile approach to address the demand for natural food colorants, appealing to the food industry's preference for safer additives.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Unravel The Potential of Biosynthetic Gene Cluster from Soil-derived Actinobacteria of Sumbawa Island, Indonesia

1. Research Team Leader

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Phone/Fax Number	:	(0371) 262 9906 Fax No : (0371) 262 0676
Email Address	:	dwi.ariyanti@uts.ac.id

2. Research Field	:	Biotechnology
3. Number of Researcher(s)	:	4
4. Research Location	:	Sumbawa
5. Time Allocation	:	2024 (March – December 2024)
6. Research Grant	:	Rp. 35,837,680
7. Summary of Research Proposal	:	

Soil derived *Actinobacteria* is known as the world's main source of antibiotics that have large potential metabolites and properties beneficial for various applications, e.g. antibiotics for medicine. Moreover, secondary metabolites derived from Actinobacteria are highly desirable for industrial purposes. However, to acquire the correct gene clusters that annotate those aforementioned functions are still challenging. Exploring and isolating the Biosynthetic Gene Cluster (BGC) of Actinobacteria from Sumbawa island's soil, where the climate and landscape uniqueness, would enrich global data collection and references.

The specific objectives of this purposed study are to establish the soil derived Actinobacteria database collections for identifying and capturing their BGC in the prospect of novel biochemical compound production. Collections of strain obtained from previous stage project will be continued with BGC identification using PCR indexing approach through adenylation (AD) and ketosynthase (KS) domains. These provide specificity of amplicon and additional library for performing next-generation sequencing (NGS) using illumina sequencer. Bioinformatics analysis will be needed to further study and strengthen the potential BGC annotated then further mapping their amplicons. In conclusion, the results will provide the ground-breaking database, leads to the opportunities unraveling the BGC from soil derived Actinobacteria of Sumbawa Island, Indonesia.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Nanoparticle-Enhanced Laser Induced Breakdown Spectroscopy for Rapid and Sensitive Determination of Heavy Metal Content in Foods

1. Research Team Leader

Name	: **DR. MUHANDIS SHIDDIQ, S.SI., M.SC.**
Sex	: Male
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2. Research Field	: Spectroscopy for Detection of Toxic Elements in Food
3. Number of Researcher(s)	: 2 (two)
4. Research Location	**:** BRIN (KST BJ Habibie, South Tangerang)
5. Time Allocation	: 1 (one) year
6. Research Grant	: Rp. 39,500,000
7. Summary of Research Proposal	:

Monitoring toxic heavy metals in food products is essential. However, traditional methods for detecting heavy metals are usually slow or non-portable. Laser-induced breakdown spectroscopy (LIBS) has been used to determine heavy metal content because it is fast and can be done in-situ. Nevertheless, analysis of heavy metals using LIBS produces relatively high limits of detection (LODs) makes it difficult to detect trace metal elements. One of the easiest ways to enhance the LIBS signals is by using nanoparticles.

This technique is called nanoparticle-enhanced LIBS (NELIBS). We propose a research project to develop NELIBS technique for rapid and sensitive determination of heavy metal content in foods.

We will focus the research on detecting As, Cd, Cr, Cu, Pb, and Hg in rice, fish, apple, and lettuce. In our NELIBS experiments, we will use Au, Ag, and Au-Ag alloys as the nanoparticles. We hypothesize that we can enhance the LIBS signal by two orders of magnitude by using nanoparticles. This enhancement makes the LODs of heavy metals will reach parts per billion (ppb) values which are mostly under maximum values for human consumption allowed by World Health Organization (WHO). If successful, this research will make food safety control much faster and easier.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

MOdified CHItin NanocrysTals as a glucOSE sensing device (MOCHINTOSE)

1. Research Team Leader

Name	:	**ROBERTUS WAHYU N. NUGROHO, Ph.D.**
Sex	:	Male
Place/Date of Birth	:	Jakarta/13-09-1982
University/Institution	:	National Research and Innovation Agency (BRIN)
Department/Faculty	:	Research Center for Biomass and Bioproducts
Address of Institution	:	Jl. Raya Jakarta-Bogor No. Km. 46, Cibinong, Bogor
Phone/Fax Number	:	081286936956 Fax No: -
Email Address	:	robe009@brin.go.id elctro.chem1@gmail.com

2. Research Field	:	Fibre and Polymer Science
3. Number of Researcher(s)	:	7 (including the PI)
4. Research Location	:	Indonesia
5. Time Allocation	:	A year
6. Research Grant	:	Rp. 39,872,500
7. Summary of Research Proposal	:	

MOCHINTOSE envisions a game-changing approach to produce a simple, low-cost, sustainable, and non-electronic biosensor made of modified chitin nanocrystals (ChNCs) without adding metal nanoparticles. With this advanced design, the painful needle-equipped electronic glucometer can be replaceable. Through the molecular complexation phenomena, this modified chitin-based sensor will capture glucose molecules originating from various excretory systems (oral, dermal, and urogenital tract) in human beings. This unique biosensing device is accessible through multiple syntheses. Further, the first strategy involves polymer grafting via surface initiated-ring opening polymerization (SI-ROP) of L-lactide monomer at the surface of ChNCs. Besides SI-ROP, different functionalization chemistries can be thoroughly exploitable. The surface chemistries include the incorporation of phenylboronic acid derivative, while the second approach deals with the conjugation of β-cyclodextrin and immobilization of glucose oxidase (GOx) enzyme. Then, the di-ol-modified fluorescent probe and pyrene, respectively, will modulate the fluorescence intensity between modified ChNCs and glucose molecules under the characterization of photoluminescence spectroscopy. Various samples naturally originating from saliva, sweat, and urine will be attached to this biosensing film to evaluate color-changing ability and sensitivity. Eventually, cytotoxicity and cell proliferation provide information to ascertain that this advanced biosensor is secure for human health and the environment.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Deletion of miRNA 2059 Gene from Chili (*Capsicum annuum*) by CRISPR/Cas9 Genome Editing to Improve Tolerance to Pathogens

1. Research Team Leader

Name	: **KARLIA MEITHA PH.D.**
Sex	: Female
Place/Date of Birth	: Bandung, 22 Mei 1984
University/Institution	: Institut Teknologi Bandung
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2. Research Field	: Genome Editing
3. Number of Researcher(s)	: 2
4. Research Location	: Institut Teknologi Bandung
5. Time Allocation	: 10 months
6. Research Grant	: Rp.38,917,580
7. Summary of Research Proposal	:

This research aims to enhance the tolerance of chili (*Capsicum annuum*) to anthracnose and blight diseases caused by *Phytophthora sp*. and *Colletotrichum sp*., respectively, which negatively impact chili production in Indonesia. The primary objective is to delete the mir2059 gene that targets one of the key resistance genes in chili, using the CRISPR/Cas9 gene editing system. The hypothesis is that the elimination of mir2059 expression will increase the synthesis of the disease resistance protein (PDRP-RGA1) in chili plants, leading to improved tolerance. The method involves designing double guide RNAs targeting mir2059, incorporating them into the CRISPR/Cas9 system, introducing the editing genetic editing machineries transiently into chili plants, and challenge the edited plant with pathogen. The research comprises five steps, including bioinformatics analysis, guide RNA design, genome editing, plant transformation, and phenotypic analysis. This study not only addresses an urgent agricultural issue but also contributes to advancing genome editing technology in Indonesia. The results have broader implications for crop improvement and sustainable agriculture.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Application of Active-Modified Atmosphere Packaging (a-MAP) based on Oxygen Absorber to Reduce Chilling Injury (CI) in Tomatoes (Solanum Lycopersicum)

1. Research Team Leader

Name	: **DR. FAHRIZAL YUSUF AFFANDI**
Sex	: Male
Place/Date of Birth	: Yogyakarta, 26 Oktober 1981
University/Institution	: Universitas Gadjah Mada
Department/Faculty	: Dept of Bioresourve Technology & Veterinary / Vocational College
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2. Research Field	: Postharvest Technology
3. Number of Researcher(s)	: 4
4. Research Location	: Yogyakarta
5. Time Allocation	: 11 months
6. Research Grant	: Rp. 37.000.000
7. Summary of Research Proposal	:

In this research work, we investigate the ecosystem of microorganisms including bacteria genus and fungi genus that exist in fruit garbage enzyme through microbiome approach. We also measure the enzyme content and activity of ecoenzyme from crude oil remediation process. To optimize the enzyme role in remediation we analyze the correlation of microorganism diversity and enzymatic product. The research will be started by taking fruit garbage enzyme samples made from pineapple peel fermented with molasses and water for 3 months. The enzyme will analyze using qualitative approaches to determine lipase, protease, laccase, oxygenase, hydroxylase, and dioxygenase presence in ecoenzyme. Extraction and amplification of DNA with NucleoSpin® Tissue kit (Macherey-Nagel, Duren, Germany) to isolate DNA in samples. Bacterial and fungi 16S rRNA sequences were detected using primers then PCR amplification and nested PCR were performed. Sequence results of more than 200 bp were analyzed by 80% similarity threshold as an operational taxonomic unit. OTU will be analyzed by Kruskall-Wallis and the Shannon-Wiener diversity index calculated. The abundance of bacterial and fungal genera obtained will be tested by pearson's test to the enzyme activity.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Eco-friendly and High-Performance Biocatalyst for Textile Dye Waste Removal: Laccase Immobilization on Magnetic Fe_3O_4@Cellu@UiO-66 Nanocomposite

1. Research Team Leader

Name	:	**RETNO AGNESTISIA, S.Si., M.Sc., Ph.D.**
Sex	:	Female
Place/Date of Birth	:	Palangka Raya, 28 December 1990
University/Institution	:	Univeritas Palangka Raya
Department/Faculty	:	Chemistry/ Mathematics and Natural Sciences
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2. Research Field	:	Biomaterial
3. Number of Researcher(s)	:	4 (four) researchers
4. Research Location	:	Biomedical Laboratory, Faculty of Medicine, Univeritas Palangka Raya
5. Time Allocation	:	1 (one) year
6. Research Grant	:	Rp. 39,500,000
7. Summary of Research Proposal	:	

This research aims to develop a biocatalyst based on laccase immobilized on Fe_3O_4@Cellu@UiO-66 to removal textile dye waste. The product is a novel hybrid nanocomposite consisting of Fe_3O_4, cellulose, UiO-66, and laccase isolated from a white rot fungus in the Peat Swamp Forest of Central Kalimantan. It is expected that it can improve the performance of laccase as a stable and reusable biocatalyst.

Fungal isolates will be cultivated on modified Kirk's medium. The crude enzyme from laccase will then be extracted and its activity will be assayed using syringaldazine as a substrate. Protein concentration will be determined using the Bradford method. The crude laccase will then be immobilized with Fe3O4@ Cellu@@UiO-66 and characterized using the X-ray Powder Diffraction (XRD), Fourier Transforms Infrared (FTIR), Vibrating-Sample Magnetometry (VSM), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM) methods. Free and immobilized laccases are then used to degrade dye waste from the Textile Industry of Batik Benang Bintik from Central Kalimantan. The reaction is carried out at the optimum pH and temperature for laccase activity, while the reaction progress is monitored using a UV-Vis spectrophotometer. The reuse of immobilized laccase in Fe_3O_4@Cellu@UiO-66 will also be investigated for 10 cycles at optimum conditions.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Development of Neoagarooligosaccarides β-agarase from Streptomyces sp. Isolated from Marine Sediment as A Novel Skin Whitening and Moisturizing

1. Research Team Leader

Name	: **SITI EKA YULIANTI, M.Si.**
Sex	: Female
Place/Date of Birt	: Cirebon, July 5th, 1987
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2. Research Field	: Biotechnology, Enzymology
3. Number of Researcher(s)	: 4
4. Research Location	: Genomik Laboratory, KST Soekarno BRIN, Cibinong
5. Time Allocation	: 1 Year
6. Research Grant	: Rp. 37,472,500
7. Summary of Research Proposal	:

Indonesian marine environments harbor a diverse array of microorganisms that produce bioactive compounds with unique properties. Neoagarooligosaccharides (NAOs) produced through agarose hydrolysis by **β**-agarase enzymes are known for their moisturizing and skin-whitening properties.

This proposal aims to investigate neoagarooligosaccharides hydrolyzed by the β-agarase enzyme from Streptomyces sp. isolated from marine sediment and their potential application as a novel skin whitening and moisturizing agent. NAOS has the potential to be used as a cosmetic material. NAOS has been observed to exhibit high inhibitory effects on tyrosinase and melanin biosynthesis. In the cosmetics industry, the demand for products that can control skin aging and whitening is increasing. Skin aging is associated with a loss of skin moisture. From marine actinomycetes from the Indonesian Culture Collection (InaCC), we have obtained isolates that are capable of hydrolyzing agar, agarose, and red seaweed into neoagarooligosaccharides.

The Neoagarooligosaccarides will be used for the investigation of their biochemical properties, cytotoxicity, and ability as a skin moisturizing and whitening agent in murine B16F10 melanoma cells. Hopefully, this research can provide a valuable contribution to the development of neoagarooligosaccharides as a novel moisturizing and whitening agent for the cosmetic and pharmaceutical industries in Indonesia.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Impact of Graphene Edges on Stability and Performance of Dual-atom Catalyst (XY=Fe,Mn)-N6 for Oxygen Reduction Reaction: A combined DFT, Machine Learning, MD, and Microkinetic Study

1. Research Team Leader

Name	: **DR. SASFAN ARMAN WELLA**
Sex	: Male
Place/Date of Birth	: MBandung, July 8th, 1988
University/Institution	: National Research and Innovation Agency (BRIN)
Department/Faculty	: Research Center for Quantum Physics
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2. Research Field	: Materials Computation for Energy
3. Number of Researcher(s)	: 2 persons (1 Leader + 1 Member)
4. Research Location	: BRIN and ITB
5. Time Allocation	: 1 year
6. Research Grant	: Rp. 37,500,000
7. Summary of Research Proposal	:

A viable catalyst for boosting the oxygen reduction reaction, a crucial reaction in proton-exchange membrane fuel cells, is highly required to replace the expensive and scarce platinum-based catalyst. From the prior work, a non-precious metal catalyst, i.e. FeFe-N6, supported by graphene had been reported to have a very low overpotential (0.15 V). Here, we are interested to investigate similar catalysts with special emphasize to the impact of graphene edges to its stability and catalytic activity. Graphene edges are abundant on the surface, and we expect that the (XY=Fe, Mn)-N6 will be readily formed at the edge of graphene. Moreover, graphene edges are more reactive and more easily distorted than their basal counterpart. It will help the ORR intermediates to interact with the active sites of (XY=Fe, Mn)-N6. Based on these hypotheses, we expect that these dual-atom catalysts will have a comparable or even higher catalytic activity than on the basal graphene. Our results should be beneficial not only for material scientists but also for people in the industry to develop better catalysts utilizing non-precious metals and graphene. In addition, a combination method will be demonstrated in this proposed research to reduce the computational cost without losing the accuracy.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Unveiling High-Value Triterpenoid Biosynthesis in Medicinal Legume Abrus precatorius Through Transcriptomic Analysis and Methyl Jasmonate Treatment

1. Research Team Leader

Name	:	**PRAMESTI ISTIANDARI, Ph.D.**
Sex	:	Female
Place/Date of Birth	:	Bandung, 14 January 1994
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2. Research Field	:	Plant Biotechnology
3. Number of Researcher(s)	:	4
4. Research Location	:	Laboratoty of Institut Bio Scientia Internasional Indonesia dan Genomik Solidaritas Indonesia, Jakarta
5. Time Allocation	:	12 Months (March 2024-February 2025)
6. Research Grant	:	Rp. . 41,072,000
7. Summary of Research Proposal	:	

Abrus precatorius, a medicinal vine native to India and tropical Asia, notably Indonesia, has been utilized for its leaves' and roots' sweetness and pharmacological attributes to alleviate various ailments. A significant feature of *A. precatorius* is its triterpenoid saponins, including abrusosides, uniquely found in Abrus species, and glycyrrhizin. These saponins, with sweetness surpassing sugar's by over 50-fold, offer both taste and therapeutic properties, even showing promise against COVID-19. However, their application remains limited due to inefficient extraction methods and low concentration in plants.

Biotechnology, particularly metabolic engineering, offers an innovative approach to enhance natural product production. Although the glycyrrhizin pathway has been intensively studied in licorice, *A. precatorius'* triterpenoid biosynthesis lacks clarity. Leveraging glycyrrhizin insights, researchers successfully produced it in yeast, reducing reliance on traditional cultivation methods. Therefore, uncovering *A. precatorius*' triterpenoid pathway is critical for its maximal potential, notably for abrusoside production.

Transcriptomic analysis provides a robust avenue to study plant metabolic genes. Applying methyl jasmonate (MeJA), a phytohormone acting as a defense signal, to A. precatorius could activate defenses, enhancing specialized metabolic gene expression, including triterpenoids. Thus, transcriptomic analysis of MeJA-treated A. precatorius can uncover its triterpenoid biosynthesis genes, facilitating the exploration of its valuable potential.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Changes of High Sensitive-C Reactive Protein and Inflammatory Cytokines in Elderly Coronary Artery bypass Surgery Patients Hospitalized in ICU

1. Research Team Leader

Name	: **DR. ARIEL PRADIPTA, M.Res., Ph.D.**
Sex	: Male
Place/Date of Birth	: Jakarta/ 24 June 1988
University/Institution	: Universitas Indonesia
Department/Faculty	: Biochemistry and Molecular Biology
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Phone/Fax Number	: +628161883837/+62213910734 Fax No: -
Email Address	: ariel.pradipta01@office.ui.ac.id

2. Research Field	: Health- Non Communicable Diseases
3. Number of Researcher(s)	: 4
4. Research Location	: Biochemistry and Molecular Biology FKUI and ICU of the National Cardiovascular Center, Harapan Kita Hospital.
5. Time Allocation	: September 2023 to November 2024
6. Research Grant	: Rp. 41,169,580
7. Summary of Research Proposal	:

Cardiovascular disease (CVD) is characterized by plaque buildup on artery walls, particularly Coronary Artery Disease (CAD), affecting the heart and blood vessels. Coronary Artery Bypass Grafting (CABG) surgery is a crucial intervention for CAD patients. During CABG surgery, patients experience acute inflammation, including increased levels of hs-CRP and inflammatory cytokines. This study focuses on elderly ICU patients at Harapan Kita Hospital who undergo coronary bypass surgery with screening features of being over 60 years old, excluding smoking history and COPD, by measuring Hs-CRP levels and inflammatory cytokines before and after surgery.

The hypothesis of this study is that there will be changes and increases in the levels of hs-CRP and pro-inflammatory cytokines (IL-6 and IL-8) and anti-inflammatory cytokines (IL-10) following CABG surgery. The study will analyze hs-CRP and cytokine before and after CABG surgery. The data will be presented as mean ± SD and graphically. Statistical analysis will employ multivariate to examine the changes in these biomarkers. We anticipate observing patterns of parameter improvement and establishing correlations between clinical conditions and biomarker levels, potentially serving as predictors of ICU length of stay post-CABG surgery. This study aims to contribute to improved postoperative care strategies and better patient outcomes.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Investigation of Quality and Safety Improvements in Traditional Food Products via Nanocomposite Coatings on Packaging Made from Indonesian Indigenous Leaves

1. Research Team Leader

Name	:	**ATA ADITYA WARDANA, S.TP., M.SI.,**
Sex	:	Male
Place/Date of Birth	:	Jember, 31 August 1990
University/Institution	:	Bina Nusantara University
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Address of Institution	:	BINUS Alam Sutera Main Campus Jl. Jalur Sutera Barat Kav. 21, Alam Sutera, Tangerang 15143, Indonesia
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2. Research Field	:	Food Technology
3. Number of Researcher(s)	:	4
4. Research Location	:	Bina Nusantara University, BRIN
5. Time Allocation	:	800 hours
6. Research Grant	:	Rp. 41,687,500
7. Summary of Research Proposal	:	

Using bioactive substances and nanotechnology together appears to be a promising way to create effective antimicrobial leaves-based packaging. The aim of this research is to characterize the antimicrobial activity and physicochemical properties of leaves-based packaging coated with propolis and ZnO nanoparticles, also to evaluate the quality of traditional food products packaged. The hypothesis of this research is that the application of nanocomposite coating on leaves-based packaging will enhance its antimicrobial features and physicochemical properties, thereby protecting and inhibiting the growth of microbes on packaged food products. Theoretically, this combination is plausible and straightforward, however in-depth investigations regarding aspects like biocompatibility, concentration, consumer acceptance, and safety are essential. The selected leaves from preliminary test will be characterized for its antimicrobial properties against pathogenic bacteria and molds through in vitro testing. Material compatibility will be analyzed using Fourier Transform Infrared (FTIR) spectroscopy, surface and internal morphology with Scanning Electron Microscopy (SEM), roughness with Atomic Force Microscopy (AFM), total flavonoid content with High Performance Liquid Chromatography (HPLC), antimicrobial mechanisms with Confocal Laser Scanning Microscopy (CLSM), and consumer acceptance will be evaluated. In vivo tests will be conducted on traditional products such as nagasari, lemper, mendut, lepet, ketupat, wajit, and similar items.

ITSF
Indonesia Toray Science Foundation
"RESEARCH PROPOSAL"

Understanding the Microbiome of Atramentous Necrosis disease (AN) infected coral species in Alang-alang Water, Karimunjawa, Indonesia

1. Research Team Leader

Name	:	**DR. DWI HARYANTI, S.Kel., M.Sc.**
Sex	:	Female
Place/Date of Birth	:	Semarang/29 March 1985
University/Institution	:	Universitas Diponegoro
Department/Faculty	:	Dept. of Marine Science/Faculty of Fisheries and Marine Science
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2. Research Field	:	Marine Biology
3. Number of Researcher(s)	:	3
4. Research Location	:	Karimunjawa, Indonesia
5. Time Allocation	:	1 year
6. Research Grant	:	Rp. 40,467,580
7. Summary of Research Proposal	:	

Climate change, global warming, and the increasing anthropogenic activities are threatening the coral reef health. One of the threats is the emergence of coral diseases, such as Black-band disease, White plague, Ulcerative white spot disease, Growth anomaly, White syndrome and Atramentous Necrosis. In Alang-alang beach, Karimunjawa, a suspected Atramentous Necrosis (AN) disease mostly infected the slow-growing massive corals, including the well-known bleaching resistance Porites. This research aims to investigate whether the microbiome composition of a coral infected with Atramentous Necrosis (AN) disease is influenced by the microbiome from seawater or sediment around it, or is it a unique composition of the specific disease' microbiome. We will utilize the Next Generation Sequencing approach to identify the microbiome of three samples of infected coral species, seawater, and sediment from the area. We will target the V4 region of 16S rRNA gene of bacteria and describe a possible area of future infection using a mathematical model approach. Further, this preliminary data can be tested to different locations and different species of coral infected with AN disease, so we have an understanding on how to tackle the emergence of coral disease.

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

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

BOARD OF DIRECTOR MEMBERS:

Chairman	:	**Dr. L. T. Handoko**
Managing Director	:	**Mr. Kazuhiko Shiomura**
Director	:	**Prof. Dr. Dali Santun Naga**
		Prof. Dr. Ir. Bambang Soehendro, M. Sc.
		Prof. Dr. Satryo Soemantri Brodjonegoro
		Mr. Hironobu Sudo, PT. TIN

SELECTION COMMITTEE

1. The Examination Selection Committee for Science Education Award:
   - **Herwindo Haribowo, Ph. D.** (chairman)
   - **Paulus Cahyono Tjiang, Ph. D.** (member)
   - **Prof. 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 ¥ 2,489,3 billion in March 2023. 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	TORAY Innovation by Chemistry	**PT Indonesia Toray Synthetics** (PT ITS)	Jakarta	Manufacturer of polyester staple fiber, nylon, polyester filament yarn & resin
2	ISTEM	**PT Indonesia Synthetics Textile Mills** (PT ISTEM)	Jakarta	Spinning, weaving, dyeing of polyester based textiles
3	ACTEM	**PT Acryl Textile Mills** (PT ACTEM)	Jakarta	Spinning and dyeing of acrylic fibers
4	CENTEX PT. CENTURY TEXTILE INDUSTRY Tbk	**PT Century Textile Industries, Tbk** (PT CENTEX)	Jakarta	Spinning, weaving, dyeing of industry blended dyeing of blended polyester & cotton textiles
5	PT EASTERNTEX	**PT Easterntex** (PT ETX)	Pandaan, Jawa Timur	Spinning, weaving of blended polyester & cotton textiles
6	TORAY TORAY POLYTECH JAKARTA	**PT Toray Polytech Jakarta** (PT TPJ)	Jakarta	Nonwoven polypropilene
7	TORAY PT TAK Textiles Indonesia	**PT TAK Textile Indonesia** (PT TATI)	Jakarta	Spinning, weaving, dyeing of polyester based textiles
8	TORAY Innovation by Chemistry	**PT Toray International Indonesia** (PT TIIN)	Jakarta	Trading company
9	TIMW	**PT TI Matsuoka Winner Industry** (PT TIMW)	Semarang	Garment