

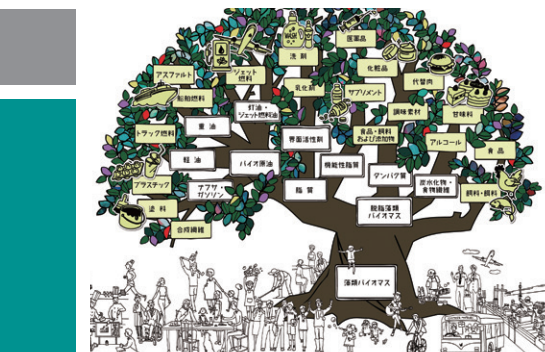


Volume
26

Enzyme Wave

2023





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Environmental Impact Monitoring Methods

In recent years, worldwide extreme weather events and climate disasters believed to be caused by global warming, occurring at an ever-increasing rate, have drawn people's attention to climate issues. In order to achieve the Paris Agreement's target of 1.5°C and carbon neutrality, the reduction of greenhouse gases has become a particularly pressing issue. Amid this, companies are being sought to manufacture products that are environmentally friendlier than ever.

In order to reduce the environmental impact of products, it is essential to understand at what stage of the product life cycle the product impacts the environment and to what extent. Life Cycle Assessment (LCA) is a well-known method for evaluating the environmental impact of a product or service throughout its life cycle. LCA measures resource consumption and emissions and evaluates their environmental impact, taking into account not only the environmental impact of the product or service when it is in actual use but also across its entire life cycle (literally from the cradle to the grave), from mining of materials to manufacturing, transportation, and disposal (Figure 1). Based

on the results of the assessment, the manufacturing process and product design are then improved and the materials and means of transport are chosen to reduce environmental impact throughout the product's life cycle.

The methods used in LCA are standardized by the International Organization for Standardization (ISO) 14040 and are split into four stages: (1) Goal and scope definition, (2) Inventory analysis (resources consumed and emitted at each stage), (3) Impact assessment, and (4) Interpretation of results (Figure 2). However, detailed methods are to be set according to the purpose of the calculation and the scope of the assessment.

LCA is merely an assessment method to quantify the environmental impact of a product and a tool for communication. We consider it important to look at the purpose of our LCAs and use the results as a starting point for further investigations into issues such as bottlenecks, priority issues, and unpredictability.

We at Amano Enzyme are committed to reducing the environmental impact of our products by using LCAs in addition to other methods to help achieve a sustainable society.

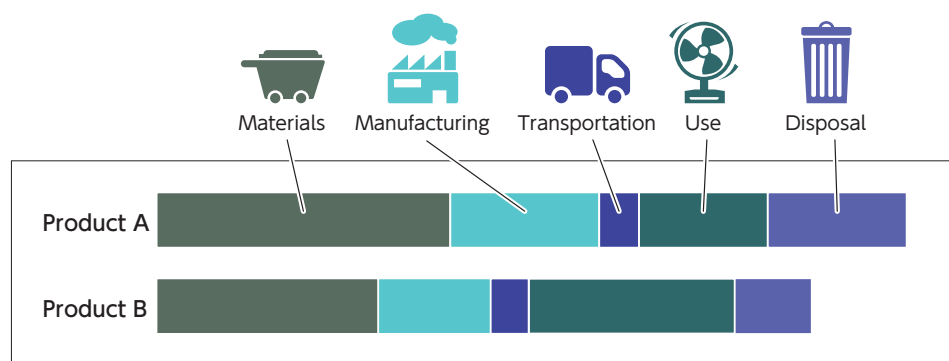


Figure 1. Environmental impact assessment of a product's entire life cycle. Product A has less environmental impact while being used than Product B, but it has a higher environmental impact during manufacturing and disposal. As a result, the environmental impact of Product A is greater than that of Product B over its entire life cycle.

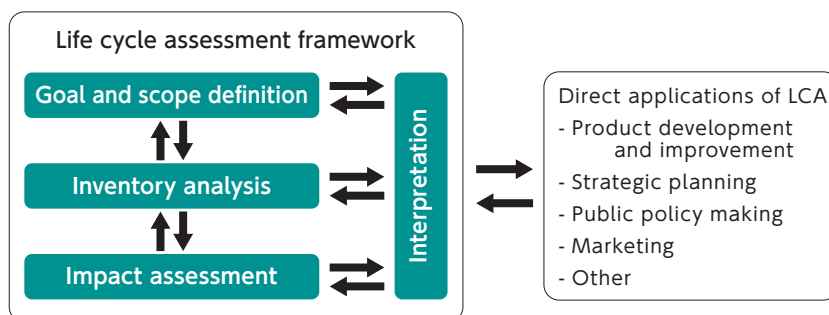


Figure 2. LCA steps and framework as defined by ISO 14040

Author

Daiko Matsuyama

Deputy Head Priest of Taizo-in Temple in the Myoshinji Temple complex

[Brief background]

Born in Kyoto in 1978. Graduated from the Graduate School of Agricultural and Life Sciences, The University of Tokyo in 2003. After three and a half years of training at Heirinji Temple in Niiza City, Saitama Prefecture, he became Deputy Head Priest at Taizo-in Temple in 2007. He was selected as one of the "The Top 100 People of the New Generation" by Nikkei Business magazine in 2016, and has been a visiting lecturer at Stanford University since 2018. In 2019, he received the Commissioner for Cultural Affairs Award (Agency for Cultural Affairs) and the Shigemitsu Award (Japan Society of Boston). In 2022, he came a tourism ambassador of Kyoto. He has also had an audience with the former Pope in 2011, met with the 14th Dalai Lama in 2014, and had exchanges with various religious figures and leaders from around the world. His work extends beyond both boarder and religious boundaries.



In the "Biotechnology in Japan" series, we share contributions on Japanese culture and traditions.

In this fourth installment, we are pleased to have Mr. Daiko Matsuyama, Deputy Head Priest of Taizo-in Temple in the Myoshinji Temple complex and someone whose activities cross boarders and religious boundaries, write about the strengths and unique qualities of Japanese people, some of which they may not even be aware of.

Japan's presence in the world is declining. This has been talked for a while, but I feel that the uniqueness of the Japanese people can still be demonstrated as a strength in the world.

For example, when I teach zazen (seated meditation in Zen style), I am reminded that Japanese people are very patient and polite. Many Japanese children do exactly as they are

told. But children in other countries tend to be more like, "What's this? and they cannot sit still for very long. Of course, one of the main reasons for this is that they are not used to sitting still, but I think we should have more confidence in their ability to steal and imitate the good points of others and to do what they are told honestly.

Another characteristic of foreign students is



that they are willing to move if they have an idea of what is ahead, but they tend not to move unless they have a reason to do so. For example, in the world of Zen, if there is no proof or methodology that enlightenment can be attained in this way, many people will not be able to continue and will quit. There is no assurance that one will attain enlightenment even if he or she continues with rigorous practice. Even in such a situation, Japanese Zen monks still continue to seek enlightenment seriously. This kind of stance can be said to be uniquely Japanese. In the field of science, the research of Dr. Omura, who was awarded the Nobel Prize in Physiology or Medicine, is an extremely Japanese approach, a feat that could not have been achieved by Western research.

When we look around the world, we find that people have a different impression of us than we have of ourselves in Japan. For example, according to a survey on creativity conducted by an international organization, the most common answer to the question "Which country do you think is the most creative in the world?" However, when the same question was asked of countries other than Japan and the U.S., more than 30% of respondents answered "Japan," surpassing the U.S. as the most common answer. Japanese people generally consider themselves to be good at discipline and group behavior but lacking in creativity. Why, then, are the Japanese considered creative in other countries?

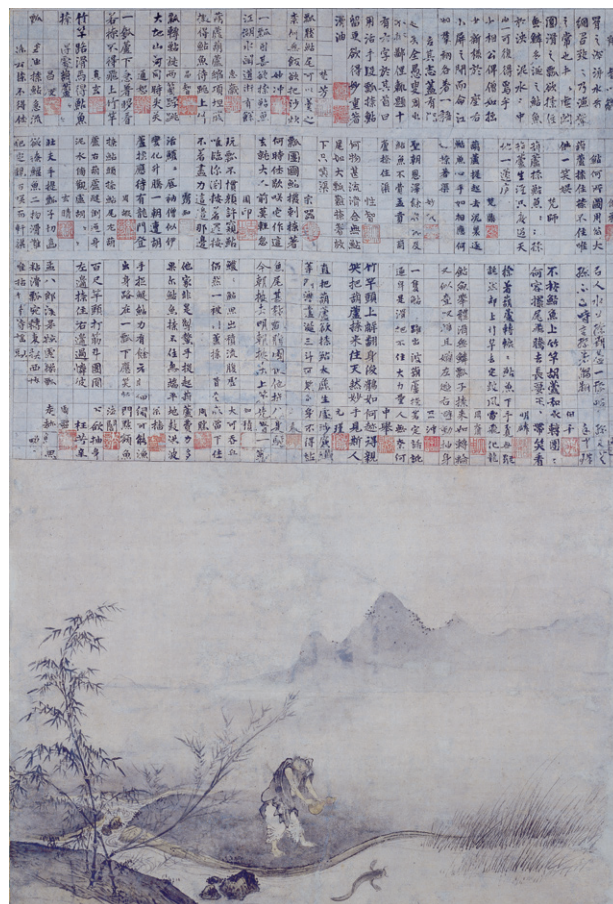
For example, in the U.S., the methodology for creating new things is very good, and the willingness to come up with ideas, even if they fail, and to create something creative is outstanding. However, sometimes the impact is shallow, and many things are produced that do not last long. In Japan, these ideas may be considered "interesting" or "crazy," but they are not considered truly innovative and full of creativity. I think the Japanese definition of creativity is something universal, something that will continue to be loved and have an impact 100 or 200 years from now.

For example, Sony's Walkman would fall into this category. In order to be considered creative in Japan, something must have universal value that transcends time. To achieve this, I think it is necessary to adopt the ancient concept of "Syu, Ha, Ri," which means to follow and master a good example. "Syu" means to imitate a good example. Learning the kata (pattern) and acquiring tradition. Once the kata has been

firmly mastered, the "break (Ha)" is then carried out. And finally, you must "let go (Ri)" of it as your originality. Only after following these steps can something truly creative be born. It is this kind of deep insight and respect for tradition that has enabled the Japanese to create things that have been loved and influential for hundreds of years since then.

The concept of time has become very short in many different fields. Of course, American-style creativity is necessary, but at the same time, I feel that Japanese-style creativity is also very meaningful. I believe that a person who can fuse these two concepts is a creative person in the true sense of the word.

Certainly, there is much to learn from other countries, and it is important to look outward. However, we cannot know our own true nature if we only look outside ourselves, and we cannot change what needs to be changed if we do not know ourselves. Although I do not agree with some of the recent trends that praise Japan so much, I feel that it is important to understand our own identity and uniqueness, and to preserve it.



National treasure Hyonen-zu by Josetsu. Owned by Taizo-in temple

The 1st Asia-Pacific Enzyme Technology Symposium : Towards Sustainable Social Development

The 1st Asia-Pacific Enzyme Technology Symposium was held on October 12, 2022. This symposium was jointly organized by the National Science and Technology Development Agency of Thailand (NSTDA) and Amano Enzyme with the aim of providing the latest information on enzyme technology to researchers and developers involved in enzymes in the Asia-Pacific region and contributing to the promotion of enzyme technology in industry, with the goal of achieving the development of a sustainable society. The symposium was the first academic symposium on enzyme technology in the region, and was held hybrid, in Bangkok, Thailand, as the main venue and online.

The symposium consisted of four sections with a total of 12 presentations. In addition to lectures by academics in enzyme technology research in Japan, Thailand, Singapore, Malaysia, Indonesia, Vietnam, and India, the symposium offered a diverse range of content, including special lectures from companies whose business is based on unique biotechnologies. The event was

attended by 97 people in person and 288 people online. A lively Q&A session was held during a panel, reminding us of the level of attention being paid to enzyme technology at the moment.

Amano Enzyme will continue to hold symposiums in the Asia-Pacific region and make every effort to further develop the industry and achieve a sustainable society through enzymes.



The main venue



Lecture



The Q&A session

Speaker	Affiliation	Title
Pimchai Chaiyen	VISTEC	Enzyme Catalysis and Engineering for Green Production
Yasuo Ohnishi	The University of Tokyo	Ultrahigh Thermoresistant Lightweight Bioplastics Developed from Fermentation Products of Cellulosic Feedstock
Akhmaloka	Bandung Institute of Technology	Exploration of Lipases for Biodiesel Process
Satoshi Koikeda	Amano Enzyme Inc.	Enzymes Catalyze Bio-Economy Society: Amano's Challenge
Sridevi A Singh	CSIR-CFTRI	Enzyme Technologies in Food Applications for Improved Functionality and Nutrition
Vu Nguyen Thanh	FIRI	Exploring Fungal Diversity in Vietnam for Novel plant Biomass-degrading Enzymes
Sittiwat Lertsiri	Mahidol University	Implication of Koji Macerating Enzymes in Application of Protease
Suraini Abd Aziz	University of Putra	Utilization of Agrowaste Materials as Sustainable Green Feedstock for Enzymes Production through Biorefinery Approach
Kohsuke Honda	Osaka University	Make It Possible Outside the Cell-design and Implementation of Enzyme Cascades
Xixian Chen	A*STAR	Integrate Enzymatic and Metabolic Engineering for Terpenoids Biosynthesis
Keisuke Morita	Spiber (Thailand) Ltd	Brewed Protein - Expanding the Range of Sustainable Materials
Ryo Iko	CHITOSE GROUP	Splash BIO on the EARTH!! ~Culture that Will Remain for 1000 Years~

Trend

Art Exhibition "Seeing the invisible" was held

For 79 days between September 17 and December 4, 2022, the art exhibition "Seeing the Invisible," which showcased the invisible world of enzymes in various ways, was held as a part of the special exhibition "Fermentation Tourism Hokuriku" at the Kanaz Forest of Creation (Awara City, Fukui Prefecture).

Enzymes are used in various aspects of daily life and are now an indispensable part of modern life. However, the general public rarely has the opportunity to come into contact with the world of enzymes, which lay beyond our awareness and what we can perceive with the naked eye, and has hardly any knowledge of what they can do and their potential. Because of this, Amano Enzyme set up the website "Seeing the Invisible" (mienaimono) in 2020 in the hopes to share with as many people as possible the functions of enzymes, how they can contribute to achieving a sustainable society and the ever-expanding world of enzymes that has the potential to solve a range of social issues.

Staying faithful to the design of the website, this year's exhibition showcased the world of enzymes through the website's popular Map of the Enzyme Universe, and a song for the Seeing the Invisible exhibition, which gave visitors the chance to learn about enzymes through song

and dance. On October 23, a workshop and talk were also held to allow the public to experience the mysterious workings of enzymes, making this a special chance for the public to get to know more about enzymes.

The exhibit has ended, but the map and song which were created for it are both available on the Seeing the Invisible website. The website also features Enzyme Talks, a series of interviews with experts in a variety of fields, from everyday food to space, about the future and potential of enzymes. Visit the website for yourself and take a moment to learn and enjoy more about enzymes.

Seeing the invisible

Besides the Enzyme Universe and songs, there are plenty of other tricks to learn about enzymes!



<https://mienaimono.jp/en/>



Art Exhibition and Talk Show

(Bottom right: Talk show From right, Mr. Hiraku Ogura, curator of the Fermentation Tourism exhibition, Dr. Sakayu Shimizu, professor emeritus at Kyoto University, and Satoshi Koikeda, deputy general manager of Innovation Division, Amano Enzyme)

The 4th Sino-Japan Symposium on Biocatalysis and Biotransformation

Amano Enzyme holds the Japan-Sino Symposium on Biocatalysis and Biotransformation every other year in collaboration with Zhejiang University in China. The symposium aims to connect Chinese companies interested in enzyme-based sustainable industrial processes with professors from Japanese and Chinese universities and public research institutions conducting cutting-edge research in the field, and to contribute to the development of the field.

The fourth symposium was held on November 26, 2022. Despite being held entirely online due to COVID-19 restrictions in China, a large number of people attended the symposium, with over 440 joining from China. A total of 15 speakers (see below) presented, including two online lectures from Japan by Prof. Shuji Akai (Osaka University) and Prof. Haruyuki Atomi (Kyoto University). The lectures covered a wide range of topics, but mainly highlighted the results of studies on the functional modification of enzymes using GMO technology and the improvement of enzyme productivity.

In recent years, global efforts to realize a sustainable society, as set forth in the SDGs, have

been gaining momentum. Enzyme-based Green Chemistry has also been expected to play a central role in these efforts.

Amano Enzyme will continue to hold this symposium in order to deepen the exchange of technologies between China and Japan, and will make every effort to support enzyme-based Green Chemistry.



The opening ceremony at Zhejiang University (right: Prof. Yang of Zhejiang University)



Prof. Akai during a lecture

Prof. Atomi during a lecture

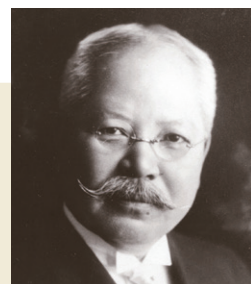
Lecture topics

Yan Feng	Shanghai Jiao Tong University	Enzyme evolution for efficient biosynthesis of bio-fuel and medicine
Shuji Akai	Osaka University	Synergy of biocatalysts and transition metal catalysts: Innovative syntheses of optically pure, functional organic compounds
Dawei Zhang	Chinese Academy of Science	Bacillus subtilis super expression system and simulation-based enzyme design strategy
Haruyuki Atomi	Kyoto University	Identification of new enzymes and pathways in hyperthermophilic archaea
Yao Nie	Jiangnan University	Biosynthesis of valuable hydroxyl compounds via asymmetric oxidoreductive reactions: Engineering of enzymatic activity and selectivity
Yusaku Kodama	Amano Enzyme Inc.	Protein Engineering using Molecular Dynamics & Docking Simulation
Binju Wang	Xiamen University	Theory reveals How Preorganized Electric Fields and pH modulate the enzymatic reactions
Zhoutong Sun	Chinese Academy of Science	Enzyme directed evolution and rational design
Ling Jiang	Nanjing Tech University	Carbohydrase genes mining and functional sugars production through multi enzymes cascade
Shuke Wu	Huazhong Agricultural University	Development of growth selection systems for directed evolution of various chiral amine synthases
Xiaoqiang Huang	Nanjing University	Visible light activated Green Biomanufacturing
Huilei Yu	East China University of Science and Technology	Molecular Evolution and Synthetic Application of Baeyer Villiger monooxygenases
Haoran Yu	Zhejiang University	Rational design of enzymes for industrial applications
Luo Liu	Beijing University of Chemical Technology	Enhanced P450 catalytic efficiency by dynamic regulation of substrate tunnel
Jingang Wang	Chinese Academy of Science	Engineering and Industrial Application of Penicillin and Cephalosporin Lyase

Jokichi Takamine Study Group, NPO

Dr. Jokichi Takamine

Dr. Jokichi Takamine lived through the dramatic period of time from the end of the Tokugawa shogunate, Meiji era, and Taisho era. He left a great legacy as a scientist, entrepreneur, and an international goodwill ambassador. Dr. Takamine is called the father of modern biotechnology for his research and development of amylolytic enzymes derived from microorganisms, mainly Taka-Diastase.



Dr. Jokichi Takamine
(photo courtesy Great People of Kanazawa Memorial Museum)

Jokichi Takamine Study Group, NPO

The NPO, Dr. Jokichi Takamine Study Group, is engaged in educational activities, such as publishing journals and holding lectures, in order to make more people aware of Dr. Takamine, who made a great contribution to the development of science and technology in modern Japan, its commercialization, and goodwill between Japan and the United States.

Main Activities

2022 marks the 100th anniversary of the passing of Dr. Jokichi Takamine on July 22, 1922. It has been a joyful year filled with opportunities for media coverage and lectures. In fall, the exhibit space at Shofuden Hall, which was relocated to Takamine's birthplace of Takaoka City in 2020, was expanded, making it a place where even more people can learn about his work. Pay the space a visit if you are ever nearby. In 2023, we will continue to provide accurate information and honor Takamine's legacy.



Completion ceremony of the relocation and expansion of Shofuden Hall to the Takaoka Chamber of Commerce and Industry Building (far right: Sakayu Shimizu, Chairperson; center: Yuki Kakuda, Mayor of Takaoka City)

Topic Aoyama Cemetery Signboard

Dr. Takamine is buried in Woodlawn Cemetery in New York, but there is also a Takamine family grave in Tokyo's Aoyama Cemetery. In commemoration of the 100th anniversary of his passing, the Study Group installed a signboard honoring Dr. Takamine's achievements. If you are ever on a stroll in the area, please stop by. Although it is not well known, many people from his hometown or who were closely related to him are buried in Aoyama Cemetery. It can be interesting to visit these other graves and think about the history they carved together.



Takamine's grave (Aoyama Cemetery)
*Detailed directions are available on the website.

Scan the QR code to visit the Study Group's website. ▶



Notification of the recruitment of new members

The Jokichi Takamine Study Group is accepting supporting members.

Supporting members will receive publications related to Dr. Takamine and regularly issued newsletters. They also receive information about lectures, events, and news.

If you would like to join us, please write your name (if you are a corporate body, company/organization name and department), postal code, address, phone number (no cell phone number accepted), occupation, age, and sex on a letter or a postcard and mail it to us. We will return a bank transfer form to pay the initiation fee and the annual membership fee.

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*For more details, please visit our website.
<https://npo-takamine.org/membership/>

Report

Amano Enzyme Joins Chitose Group's MATSURI Project

Amano Enzyme is pleased to announce that it will be joining the MATSURI project, a collaborative project between companies organized by the Chitose Group, as an Industry Structuring Partner.

The Chitose Group is a family of biotechnology companies that are working in the fields of agriculture, medicine, food, energy, and chemistry, with the aim of leaving mankind with an environment in which they can live comfortably for over a thousand years. Led by the Chitose Group, the MATSURI project aims to build unprecedented "algae-based society", through the collaborative efforts of multiple companies from a diverse range of industries, regardless of social position or type of business.

Algae are known to be far more efficient at producing biomass such as oils and proteins through photosynthesis than plants on land. They also require less water to grow than agriculture and livestock, and can generally grow anywhere there is water and light. This opens up the possibility to effectively utilize land not suited to agriculture or abandoned former farmlands.

Cultured algae can be used to produce not only food, but also fuel, plastics, cosmetics, pharmaceuticals, and many other products that people use on a daily basis. By harnessing the potential of algae as a raw material, it will be possible to achieve a sustainable industrial society that is not reliant on finite fossil fuels.

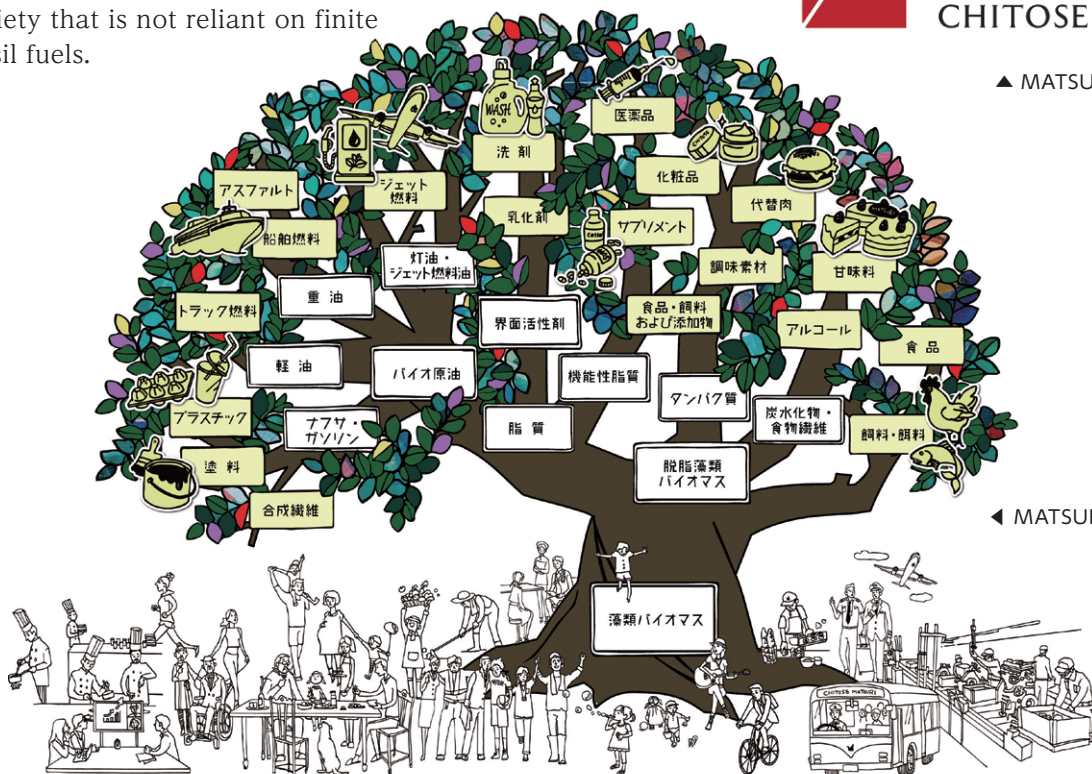
MATSURI is a project in which people from all walks of life come together, like a festival ("matsuri" in Japanese), to offer their own unique perspectives in the endeavor to construct an algae-based industry and build a world in which people may flourish and live freely for the next one thousand years.

In recognition of these ambitious goals, the MATSURI project has been chosen to receive continuous support for the next decade from the Ministry of Economy, Trade and Industry's Green Innovation (GI) Fund for R&D, proof-of-concepts, and actual implementation.

Since its establishment 120 years ago, Amano Enzyme has grown together with Japanese culture and traditions that take care of things and coexist with nature. We believe that these values we cherish relate to and are in line with the world that the MATSURI project aims to create. By utilizing the unique enzyme technology that we have cultivated over decades, we hope to contribute to the MATSURI project to build the sustainable, circular society — and new underlining industrial framework to support it — that mankind in the 21st century should seek to achieve.



▲ MATSURI Project Logo



◀ MATSURI Industry Tree

Conference presentation

Amano Enzyme has decided academic presentations such as the following.

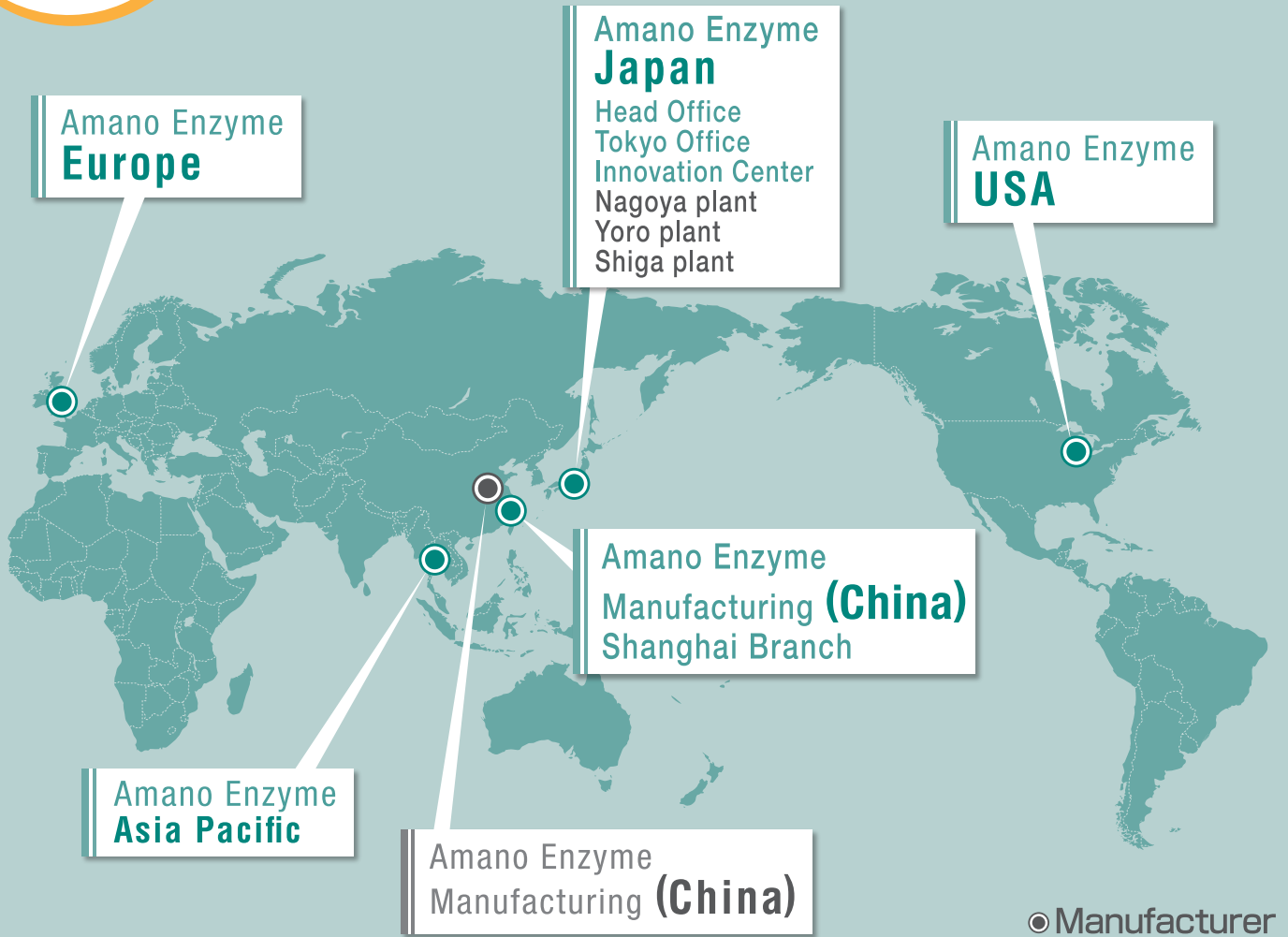
Conference/Meeting	Date	Title	Speaker
The 2022 Annual Meeting of The Japan Society for Bioscience, Biotechnology and Agrochemistr	Mar. 15 th -18 th , 2022 (Web)	Evaluation of enzyme productivity of <i>Aspergillus oryzae</i> mutant of which hyphae disperse.	Kenji Ishikawa, Koji Mito, Tetsuya Takahashi, Kan Yamashiro, Toru Katase, Satoshi Koikeda, Takuya Katayama, Junichi Maruyama, Ken Miyazawa, Akira Yoshimi, Keietsu Abe, Shotaro Yamaguti
		Enzyme exploration and application development in Amano Enzyme	Shotaro Yamaguchi
102nd The Chemical Society of Japan Meeting	Mar. 25 th , 2022 (Web)	Contribution of fermentation industry to carbon neutrality. Is it new or old innovation?	Satoshi Koikeda
Federation of Microbiological Society of Japan Forum	Apr. 23 th , 2022 (Kanagawa, Japan)	Technologies derived from exploring microorganisms : screening of enzymes	Satoshi Koikeda
Enzyme Engineering XXVI	May. 22 th -27 th , 2022 (Chicago, America)	Development of P450-BM3 Using Molecular Dynamics Simulations - A tribute to the late Professor Hideaki Yamada -	Satoru Ishihara, Satoshi Koikeda, Jinzen Ikebe, Tomoshi Kameda, Si-Bum Park, Ryotaro Hara, Shigenobu Kishino, Jun Ogawa
Kansai Branch Symposium, Society for Biotechnology, Japan	Aug. 19 th , 2022 (Web)	Our challenges in AI-based enzyme development	Satoru Ishihara, Kazunori Yoshida
Active Enzyme Molecule 2022	Sep. 30 th - Oct. 1 st , 2022 (Toyama, Japan, Hybrid)	Creation of useful industrial lipase through protein engineering	Kazunori Yoshida, Masakazu Ono, Takahiro Yamamoto, Takashi Utsumi, Shun Kawai, Masaya Fujitani, Satoshi Koikeda, Ryuji Kato, Tadashi Ema
The 74th Annual Meeting of the Japanese Society for Biotechnology	Oct. 17 th -20 th , 2022 (Web)	Creation of thermostable lipase by using machine learning	Kazunori Yoshida, Tomoshi Kameda, Yutaka Saito, Satoshi Koikeda
Symposium commemorating the establishment of the Microorganism Industry Chair, an endowed chair at Okayama University	Oct. 30 th , 2022 (Web)	Enzyme production by Japanese biotechnology "Koji (solid) culture"	Koji Mito
2nd Amano Enzyme Research Grant Presentation	Nov. 18 th , 2022 (Aichi, Japan)	Application of industrial enzymes for plant-based meat analogs	Kiyota Sakai
NBRC 20th Anniversary symposium	Jan. 26 th , 2023 (Web)	Enzymes open up the future and change the world	Shotaro Yamaguchi

Journal/Book	Date	Title	Author
International Journal of Systematic and Evolutionary Microbiology 2022;72:005253	Feb. 2022	<i>Neobacillus kokaensis</i> sp. nov., isolated from soil	Kensuke Yuki, Hirotsuka Matsubara, Shotaro Yamaguchi
Actinomycetologica 2022, Vol.36, No.1	Jun. 2022	Industrial production of enzymes derived from Actinomycetes and contribution to their stable supply	Shotaro Yamaguchi
Kagaku to Seibutsu 2022, Vol.60, No.6, p263	Jun. 2022	Biotechnology in harmony with nature	Shotaro Yamaguchi
PLoS One 2022, Vol17 No6 e0269278.	Jun. 2022	Cyclodextrins produced by cyclodextrin glucanotransferase mask beany off-flavors in plant-based meat analogs	Kiyota Sakai, Yukihide Sato, Masamichi Okada, Shotaro Yamaguchi
News of Japanese Society of Enzyme Engineering	Oct. 2022	Annual meeting report: Enzyme Engineering XXVI	Satoru Ishihara
Seibutsu-kogaku kaishi 100(10), 565	Oct. 2022	Delay retrogradation of starch	Kan Yamashiro
Scientific Reports 2022, Vol12 No1 22432.	Dec. 2022	Decolorization and detoxication of plant-based proteins using hydrogen peroxide and catalase	Kiyota Sakai, Masamichi Okada, Shotaro Yamaguchi
Food processing and ingredients	Jan. 2023	Specialty Enzyme applications for FoodTech	Kan Yamashiro, Kiyota Sakai

2023 Exhibitions

Date	Exhibition	Location
March 9	SCiftS Supplier's Night Expo	Garden Grove (USA)
March 9-11	National Coffee Association	Tampa (USA)
March 15-17	Food Ingredients China 2023	Shanghai (China)
March 22	Flavour Talk London 2023	London (UK)
April 4-6	Cheese Con	Madison (USA)
April 7-8	杭州合成生物学产业展览会	Hangzhou (China)
April 30-May 3	2023 AOCS Annual Meeting & Expo	Denver(USA)
May 17	Food Focus Thailand Roadshow 2023	Ayutthaya(Thailand)
May 17-19	ifia JAPAN 2023	Tokyo (Japan)
June 19-21	CPhI China 2023	Shanghai (China)
June 25-29	BIOTRANS 2023	La Rochelle (France)
June 30	Food Focus Thailand Roadshow 2023	Hat Yai (Thailand)
July 16-19	IFT First 2023	Chicago (USA)
August 9	Food Focus Thailand Roadshow 2023	Ratchaburi (Thailand)
September 7-8	Plant Based World Expo	New York (USA)
September 20-22	Food Ingredients Asia 2023	Bangkok (Thailand)
September 26-27	Protein Trends & Technologies Seminar	Itasca (USA)
October 6	Food Focus Thailand Roadshow 2023	Chaingmai (Thailand)
October 23-27	Fi North America, SupplySide West	Las Vegas (USA)
October 24-25	EFIB 2023	Rotterdam (Netherlands)
October 25-26	New Food Conference	Berlin (Germany)
November 2	Chicago Section IFT	Rosemont (USA)

For details and the latest information, please refer to our website or each exhibition website.



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