

# Asahi Kasei Group Intellectual Property Report 2020

## Organization for IP

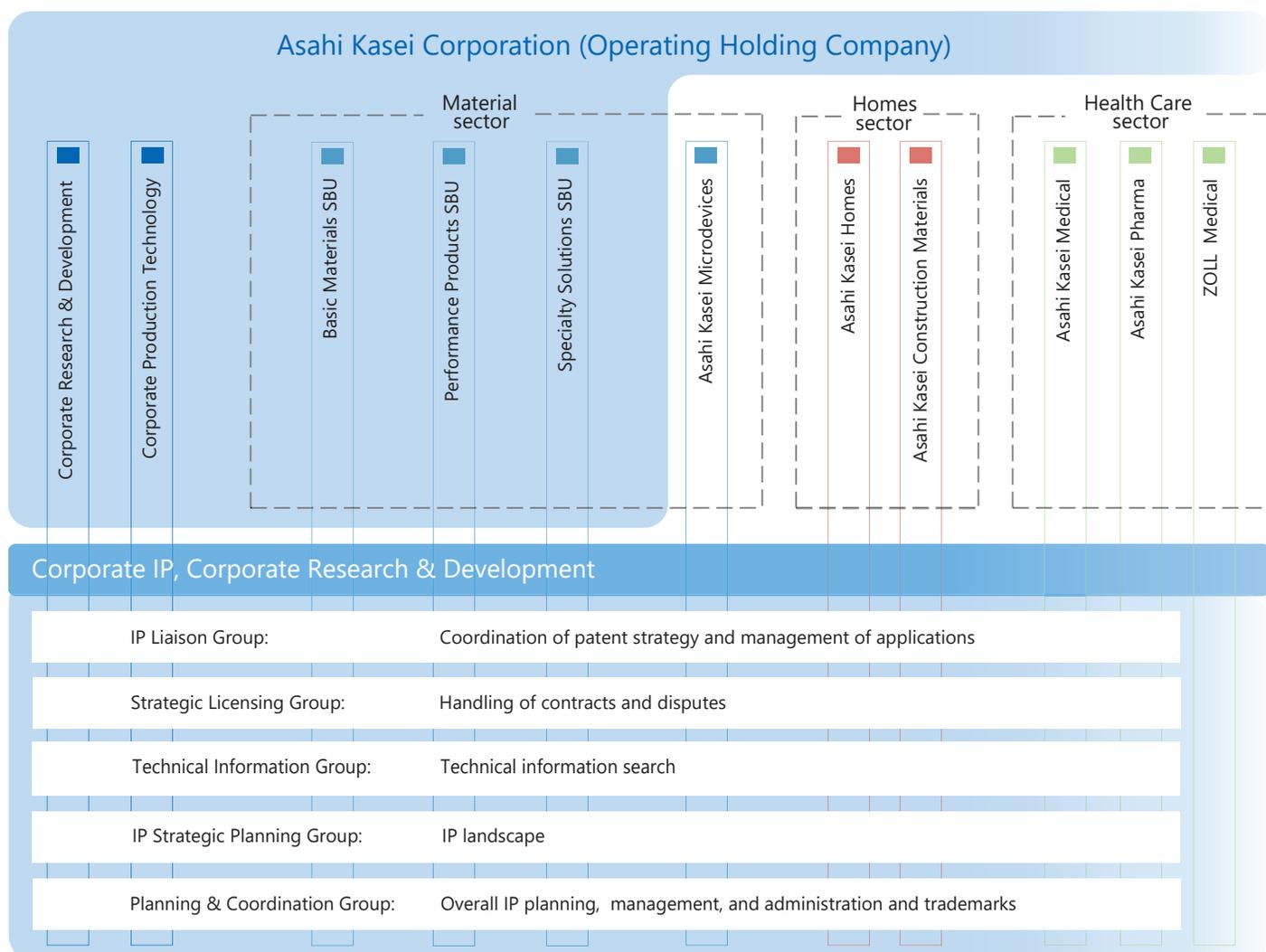
Corporate IP, part of Corporate Research & Development in Asahi Kasei Corp., is the organization responsible for management of intellectual property (IP) for the Asahi Kasei Group. Corporate IP formulates and executes the Asahi Kasei Group's overall IP strategy and provides the shared infrastructure for IP functions.

Liaison personnel of Corporate IP support the business units (strategic business units and core operating companies) by coordinating with inventors, formulating individual IP strategies, identifying IP, securing IP rights, and enforcing those rights in accordance with each business unit's business strategy and R&D strategy.

Corporate IP reinforces key functions through its Strategic Licensing Group, Technical Information Group, IP Strategic Planning Group, and Planning & Coordination Group, which provide Group-wide services performed by dedicated specialist personnel.

Corporate IP actively provides support to our overseas affiliates from Japan. ZOLL Medical Corporation and Polypore International, LP in the United States have their own IP personnel who work to identify IP, secure IP rights, and enforce those rights in accordance with their policies.

### Asahi Kasei Group Organization for IP



# IP Activities

## Mission of Corporate IP, and Main Focus

The aim of Corporate IP is to realize the mid-term business plan of the Asahi Kasei Group and to protect its business interests as a group of IP specialists who provide continued support to the innovative business, and furthermore to maximize business value.

Currently, the main focus is placed on 1) construction of an IP network which contributes to business which is based on a scenario for IP rights utilization, 2) IP clearance for guaranteeing business execution, 3) implementation of IP activities to support globalization of business, and 4) contribution to business innovation, from the aspect of IP, by digital transformation. Also underway is a well-planned, mid-term goal of IP personnel development to provide the foundation for the above.

## Thorough Patent Searching, and Compilation and Utilization of SDB

The Asahi Kasei Group considers reliable and effective patent searching to be vital, and thorough patent searches are performed at critical phases in the process of developing IP rights.

Continuous monitoring of patent information related to R&D projects for selective dissemination of information (SDI) is another focus of patent searches. These search and monitoring results are compiled into a strategic database (SDB).

One unique characteristic of the SDB is the inclusion of supplementary information specific to each individual patent (both in-house patents and other company patents) as related to each R&D project. The supplementary information includes a rank of importance, status of use, technology category, and countermeasures to other

company patents. Key aspects of the utilization of this SDB include 1) tracking trends in technologies, in markets, and in other companies, 2) identifying subjects for R&D, 3) clarifying the positioning of technologies and patents, including those of other companies, and 4) identifying patents which would pose an impediment to R&D or business operations, and formulating countermeasures.

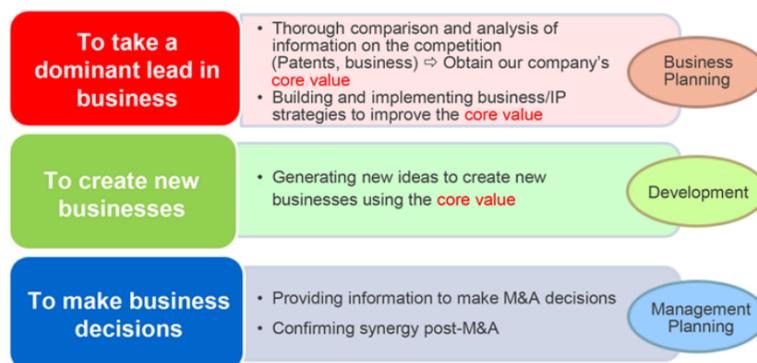
## Implementation of IP landscape

The Asahi Kasei Group actively performs IP landscaping, which leverages IP analysis for constructing and reviewing business strategies, as one of the measures for business innovation by digital transformation (DX).

Based on the industry and market information, IP information and related data are collected and processed as Big Data to formulate IP maps and associated materials, which are provided to the management and business units to inform discussions about Asahi Kasei's market position and strength, as well as business opportunities, eventually leading to management and business decisions to reinforce business, create new business, and perform M&A.

In recent years, through discussions based on the IP landscape, Asahi Kasei has been making efforts to lead the entire company by running an internal event (IPL de Connect) which gives rise to innovation as a preliminary step to the creation of new business, by prompting chain reactions of awareness as connections are made among Asahi Kasei's diverse core technologies (highly-skilled professionals), marketing functions, and planning functions.

### Three purposes of IP Landscape



**Core value: Technologies and business platforms that serve as the core of business competitiveness**

### Patent Map created by IPL de Connect



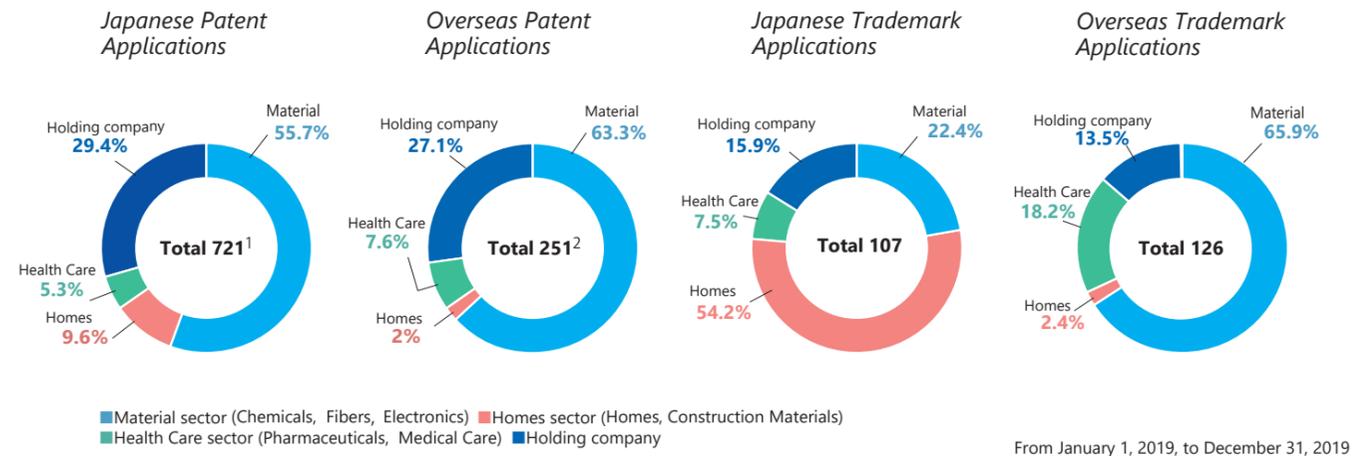
# Number of IP Applications and Rights

The Asahi Kasei Group continuously works to maintain an IP portfolio that secures market superiority in business operations. The IP portfolio is reviewed annually to determine whether to file patent applications and whether to maintain or abandon patents and applications, as well as the feasibility of licensing.

Among Japanese patents, those in practice in 2019 amount to 42% of the total (42% in the previous year). Combined with

those scheduled to come into practice, this rises to 65% (64% in the previous year). The 35% of the total which is classified as "defensive and other" includes many strategically essential patents which serve to inhibit the entry of competitors.

The number of patents held overseas is steadily rising with patent protection playing an increasingly important role for global operations.



## Number of Applications, by Business Category

From January 1, 2019, to December 31, 2019

		Material	Homes	Health Care	Holding Company	Total
Patents	Japanese	402	69	38	212	721 <sup>1</sup>
	Overseas	159	5	9	68	251 <sup>2</sup>
Trademarks	Japanese	24	58	8	17	107
	Overseas	83	3	23	17	126

## Number of IP Rights, by Business Category

As of December 31, 2019

		Material	Homes	Health Care	Holding Company	Total
Japanese Patents	In practice	2,174	452	194	197	3,017
	Scheduled to be in practice	697	280	42	583	1,602
	Defensive & other	1,808	343	154	229	2,534
	<b>Total</b>	<b>4,679</b>	<b>1,075</b>	<b>390</b>	<b>1,009</b>	<b>7,153<sup>1</sup></b>
Overseas Patents	US	868	8	107	218	1,201
	Europe	1,538	48	454	427	2,467
	Asia	2,665	26	264	671	3,626
	Other	261	24	86	101	472
	<b>Total</b>	<b>5,332</b>	<b>106</b>	<b>911</b>	<b>1,417</b>	<b>7,766<sup>1</sup></b>
Trademarks	Japanese	1,552	1,054	275	308	3,189 <sup>1</sup>
	Overseas	1,989	60	365	588	3,002

<sup>1</sup> May not equal to sums of individual totals due to sharing of certain IP rights among more than one segment.

<sup>2</sup> Overseas applications for a single patent family are counted as one.

# Strategic IP Management

## Management of IP Rights

The acquisition, maintenance, and enforcement of IP rights are performed in accordance with the Asahi Kasei Group Intellectual Property Management Regulations based on an understanding that IP is essential for business profitability.

Once IP is identified in R&D, researchers, liaison personnel, and technical information specialists work in concert to acquire IP rights. Application procedures and the storage and management of IP information are almost fully computerized, enabling the swift exchange of information with researchers and IP law firms located around the world. We work in close coordination with IP law firms as important strategic partners in the management of IP.

## Managing Trade Secrets and Preventing Unauthorized Technology Outflow

Thorough management of trade secrets and other confidential information in the Asahi Kasei Group is performed in accordance with its Secrecy Maintenance Regulations. Information in digital format is managed in accordance with Basic Regulations for Information Systems and information about individual people is managed in accordance with the Guideline for Personal Information Management. The Asahi Kasei Group implements strict measures to prevent outflow of technological information and know-how in accordance with its basic policy and management standards for prevention of technology outflow. The Asahi Kasei Group also applies internal guidelines summarizing related precautions to take when entering business overseas as well as procedures to ensure the preservation of prior-use rights worldwide.

A wide range of education and training measures are proactively employed to raise awareness and understanding regarding such issues among personnel.

## Management of Group's Brand

As the Asahi Kasei Group expands its presence around the world, the significance of the Asahi Kasei brand has become even greater. Particularly in regard to the corporate brand (including the Group Logo), the Group Emblems Guideline, which provides for matters related to the style and format for showing emblems, such as items for compliance and factors for enhancing effectiveness, has been revised to reinforce the unified global Asahi Kasei Group identity.

The corporate brand "Asahi Kasei" has been registered in 78 countries, and the Group Logo has been used since 2007. The combination of "Asahi" in lower case with "KASEI" in upper case sends out the message of newness and innovation, while at the same time promoting correct pronunciation and wider recognition. In the growing market

Group Logo

AsahiKASEI

Chinese Group Logo

AsahiKASEI  
旭化成

Company Logotype

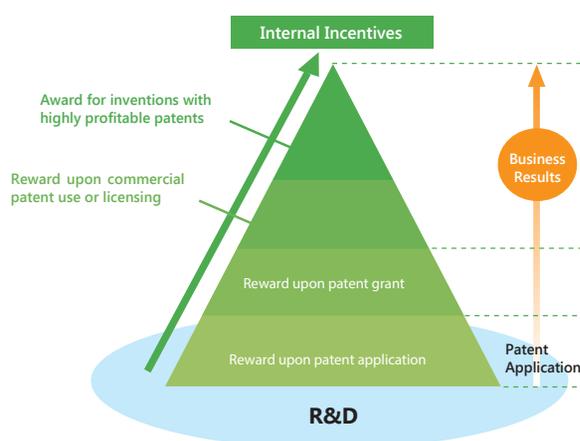
旭化成株式会社  
ASAHI KASEI AMERICA, Inc.

of China, Chinese characters for "asahi" and "kasei" are added to the logo to enhance recognition of the Asahi Kasei brand.

## Incentives for Innovation

Incentives for employee innovation include lump-sum rewards upon application for and grant of patents as well as commercial patent use or licensing, and special rewards for inventors who make exceptional contributions to business operations. In April 2005, our invention reward system was amended to eliminate any theoretical limits on rewards and to reward inventors when a patented invention is commercialized. Such incentives serve to focus the minds of our young researchers on the objective of obtaining IP rights and further promote inventions which result in commercialization. For researchers based outside of Japan, we have separate incentive systems tailored to the law and customs of each country. These systems are continuously reviewed, with further revisions made as appropriate in accordance with the times and as deemed fair and effective to foster greater motivation to obtain IP rights which make valuable contributions to operations in line with the IP strategy of each business.

System to Reward Innovation (in Japan)



## Human Resource Development

Recognizing human resources as an essential key to the execution of its IP strategy, the Asahi Kasei Group implements a comprehensive range of measures for the education and training of personnel in matters related to IP. The systematic program begins with orientation for new employees, and includes uniform training sessions for technical personnel and for marketing personnel throughout the Asahi Kasei Group. In addition, "e-learning" programs are made available on the corporate intranet to enable personnel to further enhance their practical knowledge related to IP rights.

## Honorary Fellow Dr. Akira Yoshino Major awards and recognitions

- 1999 - Chemical Technology Prize from the Chemical Society of Japan
- 2001 - Kanto-block Commendation for Invention-Encouragement Prize of Invention of the Minister of Education, Culture, Sports, Science and Technology, from the Japan Institute of Invention and Innovation
- 2002 - National Commendation for Invention-Invention Prize of the Minister of Education, Culture, Sports, Science and Technology, from the Japan Institute of Invention and Innovation
- 2003 - Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology-Prize for Science and Technology, Development Category, from the Ministry of Education, Culture, Sports, Science and Technology
- 2004 - Medal with Purple Ribbon, from the Government of Japan
- 2013 - The Global Energy Prize (Russia)
- 2014 - The Charles Stark Draper Prize for Engineering from The National Academy of Engineering
- 2018 - The Japan Prize from The Japan Prize Foundation
- 2019 - The European Inventor Award in the Non-EPO countries category from the European Patent Office
- 2019 - The Order of Culture, Person of Cultural Merit
- 2019 - The Nobel Prize in Chemistry from The Royal Swedish Academy of Sciences



Dr. Akira Yoshino

## Dr. Yoshino's Achievements

- Developed carbon materials for use as negative electrodes. Solved safety issues by making it possible to intercalate lithium ions in between layers of layered carbon materials.
- Discovered an appropriate combination of positive and negative electrodes which reduces deterioration of electric power despite electrical charging and discharging.
- Greatly contributed to putting lithium ion batteries (LIB) into practical use.

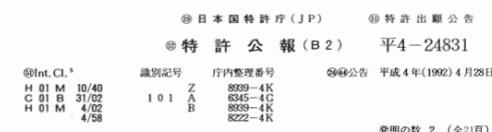
Other major patents:

Japanese Patent No. 2668678: Prototype of the current LIB

Japanese Patent No. 2128922: Aluminum foil as positive electrode current collector

Japanese Patent No. 2642206: Shutdown separator

### Original patent for LIB with Dr. Yoshino as the inventor Japanese Patent No. 1989293



特許公報 (B2) 平4-24831  
 特許出願公告 平成4年(1992)4月28日  
 発明の名称 二次電池  
 特許 昭61-103785 公開 昭62-90863  
 特出 昭61(1986)5月8日 昭62(1987)4月25日  
 優先権主張 昭60(1985)5月10日(特)日本(JP)特願 昭60-97695  
 昭60(1985)5月11日(特)日本(JP)特願 昭60-100101  
 昭60(1985)5月11日(特)日本(JP)特願 昭60-100102  
 昭60(1985)6月18日(特)日本(JP)特願 昭60-130676  
 昭60(1985)6月18日(特)日本(JP)特願 昭60-130677  
 昭60(1985)6月18日(特)日本(JP)特願 昭60-130678  
 昭60(1985)6月18日(特)日本(JP)特願 昭60-130679  
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 審査官 小柳 健樹  
 参考文献 特開 昭58-93176 (JP, A) 特開 昭59-18579 (JP, A)  
 特開 昭59-173979 (JP, A) 特開 昭60-152569 (JP, A)  
 特開 昭55-136131 (JP, A) 特開 昭60-54181 (JP, A)

特許請求の範囲  
 1 正電極、負電極、セパレーター及び非水電解液を有する二次電池であつて、下記1を正電極の活物質として、下記2を負電極の活物質として用いることを特徴とする二次電池。  
 I：非炭素質材料。  
 II：BET法比表面積A(m<sup>2</sup>/g)が0.1<A<100の範囲で、かつX線回折における結晶厚Lc(A)と真密度ρ(g/cm<sup>3</sup>)の積が条件1.80<ρLc<2.18、15<Lcかつ120ρ-227<Lc<120ρ-189を満たす範囲にある炭素質材料。  
 2 正極の活物質として用いられる非炭素質材料が、層構造を有し、一般式  
 A<sub>x</sub>M<sub>y</sub>N<sub>z</sub>O<sub>2</sub>  
 (但しAはアルカリ金属から選ばれた少なくとも一種であり、Mは遷移金属であり、NはAl、In、Snの群から選ばれた少なくとも一種を表わし、x、y、zは各々0.05≦x≦1.10、0.85≦y≦1.00、0.001≦z≦0.10の数を表わす。)で示される複合酸化物であることを特徴とする特許請求の範囲第1項記載の二次電池。  
 3 正電極、負電極、セパレーター及び非水電解液を有する二次電池であつて、下記1を正電極の活物質として用いることを特徴とする二次電池。  
 I：層構造を有し、一般式  
 A<sub>x</sub>M<sub>y</sub>N<sub>z</sub>O<sub>2</sub>

## Major External Commendations

Fiscal Year	Commendation	Organization	Title
2020	Medal with Purple Ribbon	Government of Japan	Development of Cyclohexene Process for Cyclohexanol, an Intermediate for Production of Nylon
2019	The Nobel Prize in Chemistry	Royal Swedish Academy of Sciences	The Development of Lithium-ion Batteries
	The Order of Culture	Government of Japan	Development of Lithium-ion Battery
	European Inventor Award, Non-EPO Countries	European Patent Office	Lithium-ion battery and its evolution
	The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology	Ministry of Education, Culture, Sports, Science and Technology	Development of Gold-Nickel Oxide Nanoparticle Catalysts with a Core-Shell Structure
	The Chemical Society of Japan	The Chemical Society of Japan	Development of Separator for High-Safety and High-Performance Lithium Ion Secondary Batteries
2018	Japan Prize	The Japan Prize Foundation	Development of Lithium-ion Battery
	The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology	Ministry of Education, Culture, Sports, Science and Technology	Development of Cyclohexene Process for Cyclohexanol, an Intermediate for Production of Nylon
	The Chemical Society of Japan	The Chemical Society of Japan	Development of Amoxidation Catalyst for Propane and Acrylonitrile Production Technology from Propane in the presence of above-mentioned Catalyst

## Medal with Purple Ribbon (Government of Japan)

Fiscal Year	Recipient	Achievement
1984	Maomi Seko	Development of NaCl Electrolytic Technique with Ion Exchange Membranes
1988	Akira Yomiyama	Development of Method for Producing Adiponitrile by Electrodimerization
2003	Ichiro Shibasaki	Development of High-sensitivity Thin-film Hall Elements
2004	Akira Yoshino	Lithium-ion Battery and its Evolution
2006	Junzo Masamoto	Development of New Process for Manufacturing Polyacetal Resin
2008	Shinsuke Fukuoka	Development of Novel Process for Polycarbonate Production from CO <sub>2</sub> without Using Phosgene
2015	Masaya Yamashita	Development of Electronic Compass and Automatic Adjustment Method
2020	Hajime Nagahara	Development of Cyclohexene Process for Cyclohexanol, an Intermediate for Production of Nylon

## Local Commendations for Invention (Japan Institute of Invention and Innovation)

Fiscal Year	Commendation	Area	Title
2020	The Prize of the Chairman of Shizuoka Institute of Invention and Innovation	Kanto	Low-temperature curable photosensitive resin composition for use as a protective film for semiconductor
2019	The Prize of the Chairman of Invention and Innovation	Kyushu	Ultra-Small Quantum Type Infrared Sensor Operating at Room Temperature
	The Prize of the Chairman of Miyazaki Institute of Invention and Innovation	Kyushu	Electrolysis Cell And Electrolysis Tank
	The Encouragement for Invention Prize	Kanto	Connector for 1500 DC Voltage Application in Photovoltaic Systems
2018	The Minister of Education, Culture, Sports, Science and Technology Prize	Kyushu	High-Compactibility and High-Fluidity Cellulose Powder
	The Prize of the Chairman of Shizuoka Institute of Invention and Innovation	Kanto	Photosensitive Resin Composition and Method for Producing Cured Relief Pattern
	The Encouragement for Invention Prize	Kanto	Low-viscosity Polyisocyanate Composition
	The Encouragement for Invention Prize	Kanto	Industrial Process of Acrylonitrile (AN) Production Using Propane