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# ANNUAL REPORT

The Korean Academy of Science & Technology

2019

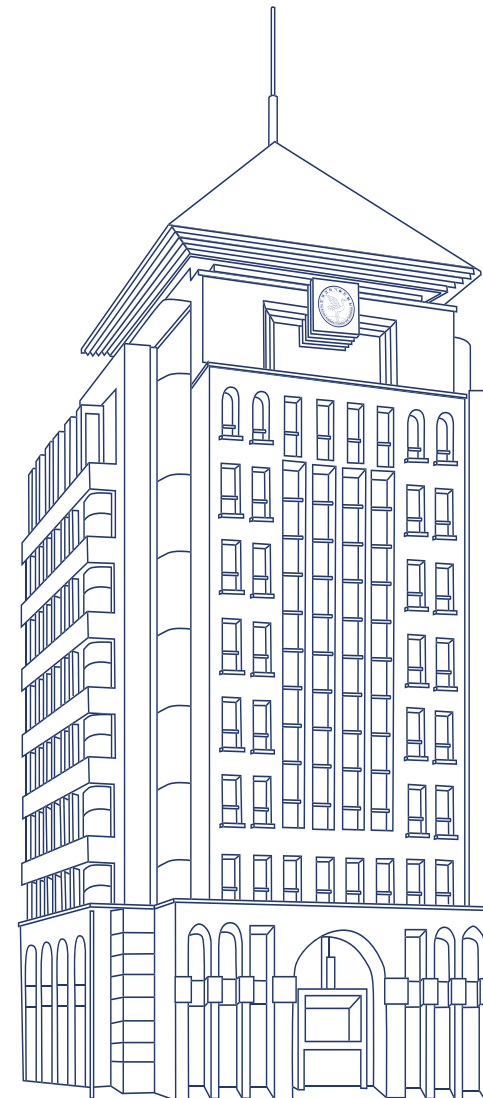
The Korean Academy of Science & Technology

KAST ANNUAL REPORT

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# ANNUAL REPORT

The Korean Academy of Science & Technology



**KAST** 한국과학기술원  
The Korean Academy of Science and Technology

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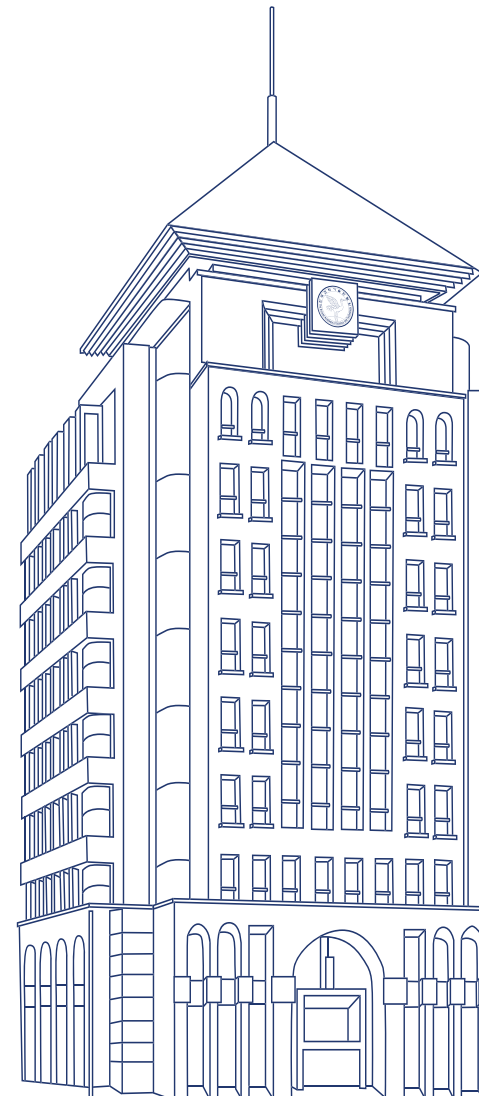


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▶ Symbol Mark

In Joseon Dynasty, officials in literary and martial arts wore embroidered badges(胸背) on the front and back of official costumes to differentiate their status and class. For the design of embroidered badges, dragon, phoenix, giraffe, peacock, crane, wild goose, tiger, turtle, deer, and etc. were used. Since the 18th century, officials in literary wore embroidered badges with the design of crane, which symbolized the elegant spirit of a scholar. For the KAST's symbol mark, the image of crane was adopted as a symbol of scholars devoted to studies based upon ancestors' tradition. This represents both traditional and modern image of the status and role that the KAST members have as a scholar.

▶ Meaning of Hanlymwon

'Hanlymwon' is a Korean word for 'Academy'. At the time when the KAST was established, Academy was used as a word which means private educational institutes in Korea. Thus, Establishment Committee of the KAST looked for an institution that played a role similar to academies in Korean history, and as a result, they found 'Hanlymwon(翰林院)', which was a royal academic research institute in Goryeo Dynasty. Hanlymwon is where scholars and talented persons engaged in studies and writings. In addition, 'Hanlymwon' have a meaning of 'a place where many scholars get together'. Now Hanlymwon is generally used in Korea as a word meaning Academy in other countries.

Location

KAST building, 42(Gumi-dong), Dolma-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13630, Korea

Online channels

www.kast.or.kr

04	MESSAGE FROM THE PRESIDENT	06
06	STATUS	08
	Summary	10
	Historical Highlights	12
	Membership	14
	Organization	
14	ACTIVITIES	16
	Advice for Policy Makers and Society	22
	People-friendly Science Promotion	26
	International Collaboration	34
	Awards	38
	Support Programs	
44	PEOPLE	46
	New Fellows of the KAST Elected in 2019	
47	PUBLICATIONS AND CHANNELS	49

## MESSAGE FROM THE PRESIDENT AND THE EXECUTIVE COMMITTEE

Since its establishment in 1994, the Korean Academy of Science and Technology (KAST) has been devoted itself to the development of science and technology in Korea by carrying out a wide range of projects, such as providing policy research and advice, establishing international exchanges, nurturing talent, and honoring and supporting scientists and engineers.

The KAST has held forums with the participation of the country's leading scientists and engineers to discuss policies for the advancement of science and technology, and to propose solutions for social issues through science and technology-based approaches. In 2019, we discussed many timely issues, such as drug addiction, PM<sub>2.5</sub> Pollution, science and technology-based national risk governance, science and ethics of cell-based therapy. The results of our discussions have been released as policy recommendations, which have been used by the National Assembly, government agencies, and related organizations as basic data and information to form the basis of policy development.

We hosted 'The IAP (InterAcademy Partnership) Conference and General Assembly 2019' to promote international exchanges in the fields of science and technology. In addition, we served as the secretariat of the AASSA (Association of Academies and Societies of Sciences in Asia) with 33 member organizations from 30 Asian countries, thus playing a pivotal role in the development of science and technology policies in Asia.

In the meantime, we continued to share scientific values and knowledge to every part of society. We operated programs under which our members visited schools that have limited chances for science education and lectured on the latest science and technology topics. In particular, we hosted a special lecture by professor Gérard Mourou, the winner of the Nobel Prize in Physics 2018 with the attendance of 600 middle and high school students. The special lecture by professor Donna Strickland, attended by about 1,000 participants, left a deep impression on both students and the general public. We also ran a 'Mentoring program for outstanding students' to provide one-on-one mentoring between students and the KAST scholars, which was dedicated to the nurturing of talent in science and technology in order to strengthen the future national competitiveness.

In addition, we made an effort to provide privileges and support to scientists and engineers as the lead agency in the 'Project for the Honorable Treatment and Support for Persons of Distinguished Service to Science and Technology', while also helping young scientists engage in international exchanges and policy activities by operating 'the Young Korean Academy of Science and Technology'.



We hope that the '2019 Annual Report' can serve as a useful resource to inform many other academies across the globe about our activities for the year, leading to further cooperation with them.

Thank you.

July 2020

**Min-Koo Han**, President of the KAST  
and Members of the 9<sup>th</sup> Executive Committee


# Summary

## Objectives

- The KAST contributes to progressing science in Korea supported by its members’ exceptional professional competence. Its members are elected by peers in recognition of distinguished achievement in their respective fields.
- As the leading science institution of the country, the KAST plays an integral role in strengthening the foundation of science and technology and in preparing to meet the challenges of future needs of our nation and the global society. The KAST is also an independent, autonomous, and nonprofit academic organization. It provides the nation with professional and objective analysis and scientific advice to lead policymakers to make sound policy decisions.
- The KAST actively seeks international academic collaboration and interacts with counterparts to reach the highest standards of excellence and carries out responsibilities as nongovernmental diplomacy to advance science and technology in Korea.



## Vision and Strategy

MISSION	To promote science and technology by consolidating a creative national foundation		
VISION	A dynamic academy		
CORE VALUES	Quality Science and Technology	International Leadership	Science and Technology with the People
STRATEGIES	<div><div><p>To develop a creative environment</p></div><ul style="list-style-type: none"><li>• To build a social framework for basic science-oriented knowledge creation</li><li>• To foster creative and convergent human resources in science and technology</li><li>• To promote science and technology as a driving force of a creative economy</li><li>• To engage in national science and technology policy-making</li><li>• To secure financing and operational independence</li></ul></div> <div><div><p>To establish international leadership</p></div><ul style="list-style-type: none"><li>• To provide scientific and technological assistance to developing countries</li><li>• To produce coordinated international responses to global issues</li><li>• To secure global leadership by facilitating international exchange</li><li>• To promote strategic international cooperation and joint research activities</li><li>• To make preparations for inter-Korean cooperation for the reunification of the Korean Peninsula</li></ul></div> <div><div><p>To promote a people-friendly science culture</p></div><ul style="list-style-type: none"><li>• To build a rational society by advancing scientific trends</li><li>• To promote local science by supporting local fraternities</li><li>• To reinforce the social responsibility of scientists and engineers</li><li>• To expand the KAST member’s social activities and participation</li><li>• To develop technologies designed for less priveleged people</li></ul></div>		





Historical Highlights

1900~



- 1994**
- The Korean Academy of Science and Technology was established
  - The 1<sup>st</sup> President Wan Kyoo Cho inaugurated

- 1995**
- KAST policy study report published
  - International symposium celebrating the establishment of KAST held

- 1996**
- KAST roundtable discussion launched
  - The 1<sup>st</sup> KAST distinguished scholars lecture held

- 1997**
- KAST colloquium launched
  - Young Scientists Awards established and awarded

- 1998**
- The 2<sup>nd</sup> President Mu Shik Jhon inaugurated



- 1999**
- KAST Science and Technology Awards established
  - KAST International Symposium launched

2000~



- 2001**
- The 3<sup>rd</sup> President In Kyu Han inaugurated



- 2002**
- KAST Advisory Committee founded

- 2003**
- New KAST building completed
  - The 1<sup>st</sup> Voice of the KAST announced



- 2004**
- The 4<sup>th</sup> President KunMo Chung inaugurated
  - The Project of 'The Korea Science & Technology Hall of Fame' transferred to KAST

- 2005**
- KAST promoted to a statutory organization by a revision to the Act on the Promotion in Researches in Basic Science
  - 'English/Korean and Korean/English Key Science & Technology Terminology Dictionary' published

2010~

- 2006**
- 'Distinguished scholars talk about science & technology' series published
  - KAST History of Development(1994~2005) published

- 2007**
- The 5<sup>th</sup> President Hyun-Ku Rhee inaugurated
  - 'Ethics Code in Science & Technology' announced



- 2008**
- Mentor Program for Outstanding Students launched



- 2010**
- The 6<sup>th</sup> President Kil saeng Chung inaugurated
  - Joined the InterAcademy Partnership for Science(IAP for Science)
  - National Assembly-KAST Society for Science, Technology and Innovation initiated



- 2011**
- The 1<sup>st</sup> Prestige Workshop held
  - The 1<sup>st</sup> Frontier Scientists Workshop held

- 2012**
- Inter-Academy Seoul Science Forum(IASSF) launched
  - The Association of Academies and Societies of Sciences in Asia(AASSA) established and hosted its secretariat



- 2013**
- The 7<sup>th</sup> President Sung hyun Park inaugurated



- 2014**
- 'Meeting with distinguished scholars of KAST' held
  - '20 years of the KAST history' published

- 2015**
- 'Cargill-KAST Bioscience Award', 'Daesang-KAST Food Science Award' launched

- 2016**
- The 8<sup>th</sup> President Myung-Chul Lee inaugurated
  - Elected as an Executive Committee member of the IAP for Science
  - Organized the project for honorable treatment and support for the persons of distinguished service in science & technology



- 2017**
- Young Korean Academy of Science & Technology (Y-KAST) launched
  - Korea Science Week 2017 held
  - Nobel Prize Dialogue Seoul 2017 held



- 2018**
- Sejong Science & Technology Forum held
  - Korea Science Week 2018 held

- 2019**
- The 9<sup>th</sup> President Min-Koo Han inaugurated
  - 'S-Oil Young Scientist Award' launched
  - Operated the 'Final Screening Committee on Government Awards of Outstanding Scientists and Engineers' by the Ministry of Science and ICT (MSIT)



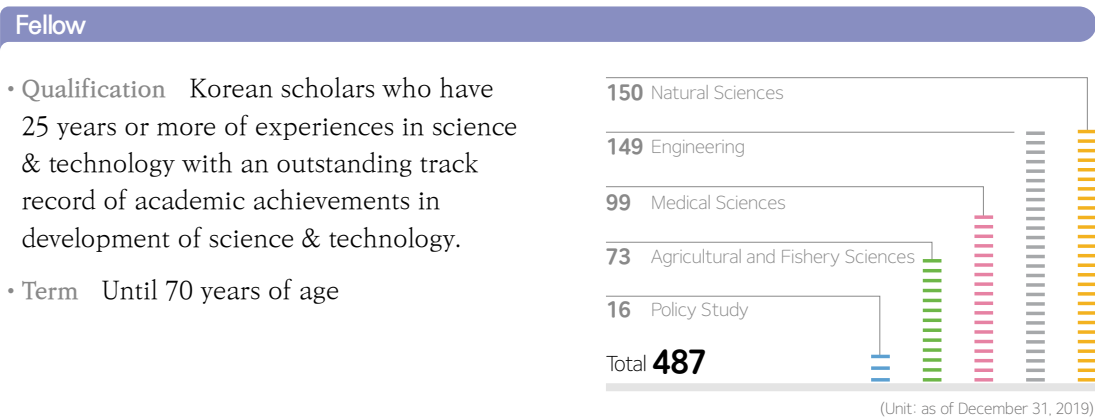
# Membership

The KAST consists of approximately 1,100 members, who together represent the country’s foremost expertise in the sciences.

The KAST contributes to progressing science in Korea supported by its members’ exceptional professional expertise. Its members are elected by peers in recognition of distinguished achievement in their respective fields in both Korea and international communities.

## ► Status of members

The KAST members are categorized into Fellow, Fellow Emeritus, Foreign Member, Associate Member, Honorary and Patron Member.



Fellow Emeritus

- **Qualification** Retired Fellows
- **Term** Lifetime

Associate Member

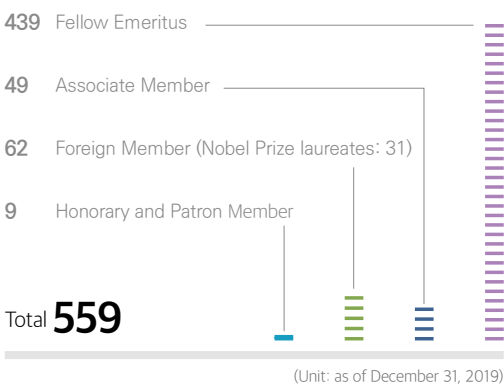
- **Qualification** Selected from excellent scientists up to 100 persons.
- **Term** 5 years, possible to be reelected once

Foreign Member

- **Qualification** Foreign Scholars who have made outstanding academic achievements.

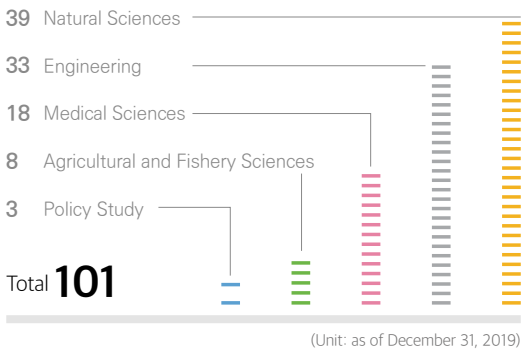
Honorary and Patron Member

- **Qualification** Individuals, corporations and organizations supporting the KAST programs.



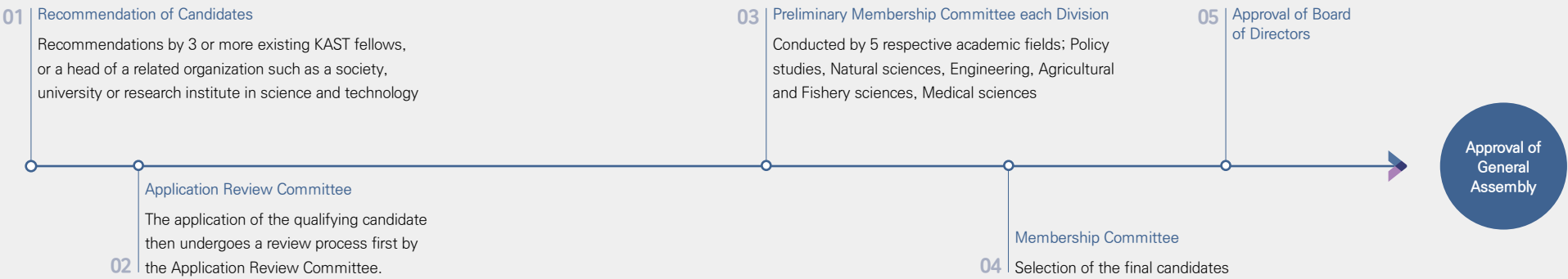
Young Korean Academy of Science and Technology (Y-KAST) Member

- **Qualification** Brilliant young Korean scientists who are 45 years old or younger
- **Term** 3 years, possible to be reelected until 45 years of age



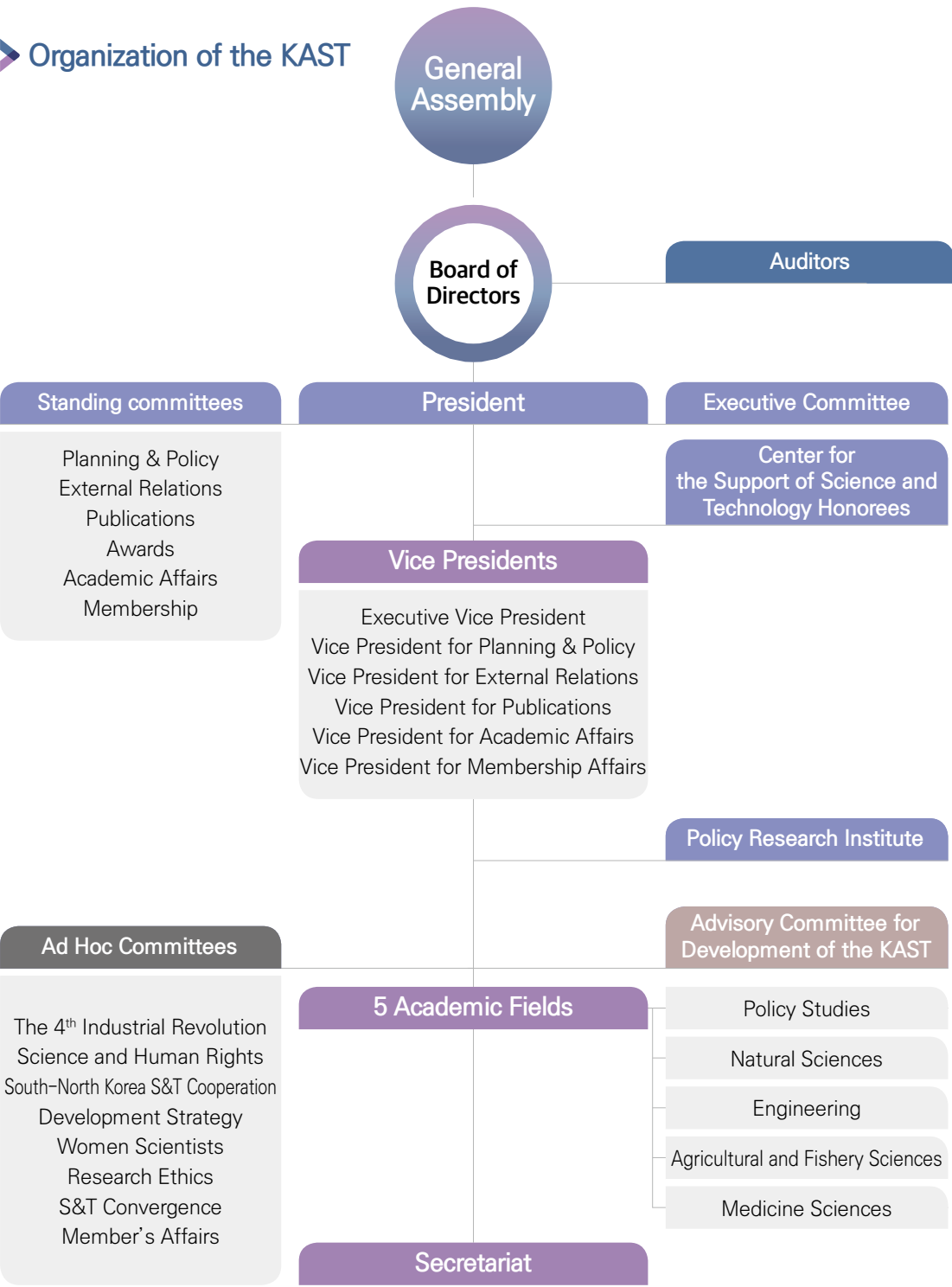
Membership Selection Procedure

The KAST undertakes a rigorous screening system and selection procedure to bring in distinguished scholars whose academic excellence has been recognized at home and abroad.



Organization

Organization of the KAST



Board of Directors

Chairman	Director						Auditor
 <b>Myung Chul Lee</b> Chair Prof. of Dankook University	 <b>Yu Sam Kim</b> Prof. Emeritus of Yonsei University	 <b>Mooha Lee</b> Prof. Emeritus of Seoul National University	 <b>Jin-hyung Kim</b> Chair Prof. of Chung-ang University	 <b>Jeongbin Yim</b> Chair Prof. of Soonchunhyang University	 <b>Hak-Soo Kim</b> Distinguished Prof. of DGIST	 <b>Kwang Soon Moon</b> Executive Director of True Happiness Inperience and Sharing	
	 <b>Moo Young Choi</b> Prof. of Seoul National University	 <b>Do-Seon Na</b> Prof. Emeritus of University of Ulsan	 <b>Seon keun Hwang</b> Prof. Emeritus of Inha University	 <b>Kyu Tek Park</b> Prof. Emeritus of Kangwon National University	 <b>Choon sik Park</b> Prof. of Soonchunhyang University	 <b>Byeang Hyeon Kim</b> Prof. of POSTECH	
	 <b>Jeong Yeol Ryu</b> Prof. Emeritus of Seoul National University	 <b>Mu Keun Lee</b> Prof. Emeritus of Seoul National University	 <b>Min-Koo Han</b> President of the KAST	 <b>Hyuk-chaе Gu</b> Director General of Future Talent Policy Bureau of Ministry of Science and ICT			

Executive Committee

 <b>Min-Koo Han</b> President Prof. Emeritus of Seoul National University	 <b>Jin-Ho Chung</b> Executive Vice President Prof. Emeritus of Seoul National University	 <b>Soon Hyung Hong</b> Vice President for Planning & Policy Prof. Emeritus of KAIST	 <b>Sung-jin Kim</b> Vice President for Academic Affairs Prof. of Ewha Womans University	 <b>Doo Sung Lee</b> Vice President for External Relations Prof. Emeritus of Sungkyunkwan University	 <b>Hoguen Kim</b> Vice President for Publications Prof. Emeritus of Yonsei University	 <b>Yun Jaie Choi</b> Vice President for Membership Prof. Emeritus of Seoul National University
 <b>Tae Eog Lee</b> Division Chair for Policy Studies Prof. of KAIST	 <b>Woo Young Lee</b> Division Chair for Natural Sciences Prof. of Seoul National University	 <b>Tai Hyun Park</b> Division Chair for Engineering Prof. of Seoul National University	 <b>Myung Ho Jeong</b> Division Chair for Medical Sciences Prof. of Chonnam National University	 <b>Je-Geun Park</b> Director for Domestic Academic Affairs Prof. of Hanyang University	 <b>Mi-Ock Lee</b> Director for International Academic Affairs Prof. of Seoul National University	
 <b>Dae Young Kwon</b> Division Chair for Agricultural and Fishery Sciences Senior Researcher of Korea Food Research Institute	 <b>Youngsook Lee</b> Director for Domestic Cooperation Prof. of POSTECH	 <b>Haecheon Choi</b> Director for International Cooperation Prof. of Seoul National University	 <b>Junghan Yoon Park</b> Chair of Y-KAST Prof. Emeritus of Hallam University	 <b>Changmo Sung</b> Director of Policy Research Institute Prof. of Korea University GreenSchool	 <b>Jang-Ryol Liu</b> Director of Center for the Support of Science and Technology Honorees Emeritus Researcher of Korea Research Institute of Bioscience and Biotechnology	





## ACTIVITIES

# Advice for Policy Makers and Society

KAST

The research and advice of the KAST serve as a compass which guides policymaking on science and technology in the country.

Armed with experts of every distinctive field, the KAST proposes a science and technology-based approach to address pending social issues. The members also gather insights and experiences to seek ways to bring innovation to science and technology.

## KAST Roundtable Discussions

As the institution's most representative forum for policy discussion since 1996, KAST's Roundtable Discussions is established to formulate long-term visions and development strategies, and to explore solutions for pending issues in science & technology.

Distinguished scholars of the KAST and other experts in diverse areas discuss in depth about extensive issues, which directly affect the people's lives as well as policies in science & technology.

In 2019, a total of 12 discussion meetings were held for science and technology experts to present their opinions on social issues. In particular, the 136th Roundtable Discussion, which discussed the topic of 'Measures to Improve the Technical Research Personnel Program,' resulted in the announcement of the government's 'Plan to Amend the Alternative Service Program'. Also, the joint forum, held with two other academies, prepared to develop strategies to respond to Japan's decision to ban the export of materials used in the production of semiconductors and display screens made the government aware of the severity of this issue and helped it come up with economic countermeasures.



No.	Date	Subject
133rd	2. 18.	The emerging hydrogen economy and challenges ahead
134th	4. 18.	Proposals for IPR creation to drive innovative growth and amendment of taxation system for employee compensation for invention
135th	5. 9.	Performance and tasks of S&T policies
136th	5.22.	Measures to improve 'The Technical Research Personnel Program' for efficient nurturing of science talent
137th	6. 4.	The current status of drug abuse and policies to solve the problems
138th	6.28.	Preemptive research strategies for scientific definition of PM <sub>2.5</sub> Pollution
139th	8. 7.	Response from S&T fields against Japan's restrictions on exports of materials needed for semiconductor and display manufacturing
140th	9. 4.	Changes in agro-food industry and innovative policy directions in the era of the 4th industry revolution
141st	9.25.	Approaches to building S&T based national risk governance
142nd	9.26.	Artificial intelligence and its future society: Utopia or dystopia?
143rd	10.17.	Bioethics in cell-based therapy
144th	11.7.	Utilization of scholarly expertise and experiences of senior scientists and engineers in the era of convergence

Policy Study Reports

The KAST members conduct research and write reports on Korea’s mid-to-long term policies in science & technology, and suggest to the government to reflect the research results into national science & technology policies. These suggestions primarily cover

- the following issues: ▲Creating the foundation for promoting research in basic science
- ▲Assessing and advising policies in science & technology
- ▲Encouraging young talents to study science, and etc.

In 2019, 7 research reports were published.

No.	Subject
126th	The current status of drug abuse and policies to solve the problems
127th	Utilization of Scholarly Expertise and Experiences of Senior Scientists and Engineers
128th	A Proposal for Amendment of Taxation System for Compensation Act of the Employee Invention
129th	Building Science & Technology Based National Risk Governance
130th	Study on the strategies of big data & artificial intelligence for the promotion of industrial development
131st	Education of Food/Agricultural areas for the 4th Industrial Revolution
132nd	Science and Ethics of Cell-based Therapy



Voice of the KAST

The "Voice of the KAST" is designed to provide a long-term vision and development strategy for national science and technology, provide scientific and technological approaches to the current issues of the nation/society and derive solutions thereof.

Based on the expert analysis and opinions of scholars in related fields, improvement schemes for policies, related laws and regulations are

proposed and also distributed to the Korean government, the National Assembly, and related organizations.

Started off with the first edition titled "Korean students avoiding science and engineering : How to elevate status of the Korean science and technology," publications had been made about 5 to 10 times a year. In 2019, six editions were distributed, totaling 82 editions thus far.

No.	Subject
77th	Suggestions for protecting public health against the spread of drug addiction – Build a national prevention/treatment system
78th	The need to expand 'The Technical Research Personnel Program' to foster core talents in the era of global competition
79th	Current status of plastic pollution and the scientific policy to solve this problem – The need to build systems for sustainable consumption and production of plastics
80th	Promote employee inventions in the fields of S&T to overcome global economic crisis
81st	Suggestions for policy directions on agro-food industry in the era of the 4 <sup>th</sup> industrial revolution – The need to shift policy paradigms to enable agro-food S&T to promote the innovation in everyday life
82nd	The need to establish rational ethics principles for the development of cell-based therapies





Next-generation Reports

‘Next-generation Reports’ is policy recommendation based on the thoughts and ideas of young scientists, mainly the members of the ‘Young Korean Academy of Science and Technology (Y-KAST)’. Each report contains policy approaches to support promising science and technology research areas and core technologies to strengthen national competitiveness on the global stage.

No.	Subject
Vol.01	Machine learning – See, think, predict like humans
Vol.02	Hydrogen society – A future building on science and technology
Vol.03	Quantum technology – Science is an endless process of verification



Infographic Book

The KAST publishes ‘Infographic Book’ containing highlights of Policy Study Reports and Next-generation Reports, and distributes them to middle and high schools and decision makers to help them understand our suggestions and recommendations more easily. Infographic Books are also available online via the KAST homepage and other channels.



Other Entrusted Projects

The KAST conducts policy researches commissioned by organizations such as government organizations, National Assembly and corporations that need policy advice from distinguished scholars in science & technology.

In 2019, KAST took part in the National Assembly’s Special Committee on the 4th Industrial Revolution and the Ministry of Science and ICTs’(MSIT) Science and Technology Policy Advisory Forum, providing policy advice in both.

In addition, the KAST carried out 3 policy research projects entrusted by the government. In particular, the ‘Research and Planning for Promoting Challenging Convergence Research to Solve Complex Scientific



(Source: National Assembly News)

Problems’ contributed to the implementation of a new R&D project of MSIT in 2020, titled ‘Development of Challenging Convergence Research Project to Solve Complex Scientific Problems (‘20~’25)’. The KAST was designated to operate ‘The National Science Challenges Support & Network’ cooperating to solve scientific challenges, and it was tasked with identifying and selecting candidate groups of scientific challenges and then planning tailored approaches to such challenges.

The KAST plans to serve as an advisor on the selected five research teams and constantly support the success of their activities, such as hosting performance review meetings and building cooperative networks with global counterparts.



(Source: Ministry of Science and ICT)

Supervising Bureau	Date	Subject
Ministry of Science and ICT	2018. 5. 21. ~ 2019. 4. 30.	Development of science-based research topics for sustainable and equitable future
Ministry of Science and ICT	2018. 10. 30. ~ 2019. 7. 29.	A Study on the Planning of Group Research Program for the Creation of New Fields and S&T Technology
Ministry of Science and ICT	2018. 11. 23. ~ 2019. 11. 22.	Research and Planning for Promoting Challenging Convergence Research to Solve Complex Scientific Problems



## ACTIVITIES

# People-friendly Science Promotion

KAST

The KAST takes the initiative in nurturing talents in science and technology to strengthen the national competitiveness in the future. All members of the KAST are committed to sharing their expertise and knowledge with the public to fulfill their noblesse oblige.

The KAST tries to create a society where everyone can enjoy science. To this end, the academy carries out a variety of activities, factoring in the specific needs of target recipient.

## KAST Lectures from Nobel Laureates

The KAST invited Professor Donna Strickland and Professor Gérard Mourou, winners of the 2018 Nobel Prize in Physics, to provide special lectures to scientists and engineers, and the general public. The topics presented in the KAST Lectures from Nobel Laureates included the professors' academic achievements and life as researchers, as well as current issues and policy directions in science and technology. The lectures were well received by the audience, which included middle and high schoolers, undergraduate and graduate students, and the general public.

In a joint interview with the Korean media, Professor Strickland emphasized the importance of government policies that support young scientists.

The lecture by Professor Mourou, which was held in suburban area, provided an opportunity to promote the scientific culture in local communities, as well as to bring hopes and dreams to the youths, with fewer chances of attending science lectures, to become aspiring young scientists and engineers.

Date	Venue	Speaker	Attendance
Jul. 12	Seoul National University (SNU)	Prof. Donna Strickland University of Waterloo (Nobel Laureate in Physics 2018)	Approx. 1,000 persons
Oct. 22	Gwangju Institute of Science and Technology (GIST)	Prof. Gérard Mourou École Polytechnique (Nobel Laureate in Physics 2018)	Approx. 600 persons

## Meeting with distinguished scholars of the KAST

It is a nationwide science lecture program in which the KAST members visit and meet young students under the slogan of 'Meeting between leading scientists of the country and young talents who will lead the future'.

If schools apply for the program, distinguished scholars of the KAST will visit schools, deliver lectures on the latest science & technology, and provide students with counseling on their career paths.

With the exceptional responses from the

participating schools, the program was further expanded in 2014.

Competition to participate in the program has increased each year, as more returning schools re-apply for the program. In response to this increased demand, the KAST held 20 more lectures in 2019 compared to the year before, amounting to 85 in total. We also focused on reducing the science education gap between regions by holding 82 lectures in schools located in regions outside of the capital and in predominantly farming and fishing villages.

No. of lectures	Attendees	Proportion of lectures targeted at schools located in rural areas
85 times	Approximately 7,000 students	96.5 %



Mentor program for outstanding students

This is a mentoring program which provides an opportunity of 1:1 mentoring with distinguished scholars in science & technology of Korea. It was designed for scientifically talented 1st and 2nd year high school students to further develop their talents in science & technology. This program motivates creative students to grow into excellent scientists through 5-month long systematic mentoring.

In order to help students to carry out their own projects, their mentors are those from

among the top scholars in the fields of mathematics, physics, chemistry, life sciences and bioengineering. Furthermore, 14 young scientists from the Y-KAST also participated as mentors.

In 2019, 30 mentors and mentees participated in the program. In particular, we focused on striking a balance between regions and realizing gender equality by prioritizing the selection of students from rural areas and female students as mentees.



No. of mentees	No. of mentors	Proportion of students from rural areas	Proportion of female students
30 mentees	30 mentors	56.6 % (17 persons)	53.3 % (16 persons)





Publication of "Distinguished Scholars Talk about Science and Technology" Series

In 2006, the KAST began publishing the "Distinguished Scholars Talk about Science and Technology" series in order to distribute quality books on science and technology, and to support the circulation of the Koreans' scientific and technological mindset. By publishing this series, the KAST is also able to support the research and writing done by the KAST members while contributing to the improvement of the quality of scientific and

technological publications in Korea.

In 2019, 33rd and 34th editions of "Distinguished Scholars Talk about Science and Technology" series were published. These books were distributed for free to 582 middle and high schools in rural and remote areas, local libraries, and more for their use in youth science education and to enhance youths' interest in the fields.

No.	Subject / Author	
 Volume 33	<b>Living to 100: The secret to healthy living is in the fermented food</b> <ul style="list-style-type: none"><li>• Author: Dong Hwa Shin, Professor emeritus, Cheonbuk National University</li><li>• Description: Overview on fermented food, including their origins and history, types, fermentation process, industry status, and development directions</li></ul>	
 Volume 34	<b>Coffee and Sea</b> <ul style="list-style-type: none"><li>• Author: Sung Yong Kim, Professor, KAIST</li><li>• Description: Explained the sea by applying physical properties of coffee as well as oceanography including purpose of research, usability, and universality</li></ul>	

Science Essay Contest

The KAST hosts the Science Essay Contest along with the People's Union for the Realization of Righteous Science and Technology.

The Science Essay Contest is a tournament that encourages creative written descriptions and expressions of the impact that Nobel Prize winners' achievements and their lives had on the scientific field and on society. Students

with outstanding essays are awarded with special benefits including a science study trip to Europe.

In 2019, numerous students participated in the "13th Science Essay Contest" and creatively expressed their scientific curiosity and passion. A total of 782 copies for the award-winning works were distributed nationwide.

No. of essays submitted	No. of students awarded
782 pieces	47 students





ACTIVITIES

# International Collaboration

The KAST is the driving force in advancing and globalizing national science and technology.

The KAST maintains a long-term friendship with science academies overseas and builds a global network so that it can play a central role in non-governmental diplomacy in science and technology.

## Cooperation with International Academic Organizations

The KAST cooperates with international organizations and national scientific academies in the world, serving as a pillar of civil diplomacy in the fields of science and technology. As an Executive Committee member of the IAP for Science, the world's largest scientific society, we are participating in major projects aimed proactively addressing current issues of the global science and technology community, thus increasing the global presence of Korea.

In 2019, we successfully hosted the IAP Conference and General Assembly, further raising the national status on the global stage. The IAP Conference and General Assembly provided an opportunity for the participants to share the latest research trends and innovative practices for sustainable development, raise global awareness for a sustainable future, and lay the foundation for international cooperation in joint research projects.

### IAP Conference and General Assembly 2019

Science and the Sustainable Development Goals: The role of academies		
Host	InterAcademy Partnership (IAP), KAST	
Date	Apr. 8 (Mon) ~ Apr. 11 (Thu), 2019	
Venue	Sheraton Grand Incheon Hotel	
Participants	200 participants from 80 countries, including delegates of IAP member countries, IAP Secretariat, speakers, etc.	
Principal Participants	Volker ter Meulen	IAP President
	Kerstin Sahlin	Vice President, the Royal Swedish Academy of Sciences
	Bruce Alberts	(Fmr.)President, the National Academy of Sciences (US)
	Romain Murenzi	(Fmr.) Rwandan Science Minister
	Jacqueline McGlade	(Fmr.) Chief Scientist, UNEP
	Katinka Weinberger	Environment & Development Policy Section Chief, UNESCAP
Achievements	<ul style="list-style-type: none"><li>• Re-elected as a member of the IAP for Science Executive Committee (2019-2021) representing the high income country (HIC) members</li><li>• Looked at the roles and responsibilities of science in achieving the UN SDGs and the paradigm shift required to realize the goals, and discussed the expectations for the KAST to support these efforts</li></ul>	

### Science 20 2019 Japan

Threats to Marine Ecosystems and Conservation of the Marine Environment – with Special Attention to Climate Change and Marine Plastic Waste		
Host	Science Council of Japan (SCJ)	
Date	Mar. 6 (Wed), 2019	
Venue	Tokyo, Japan	
Participants	Suam Kim	Pukyong National University (Fellow, Agriculture/Fishery)
	Chang Ik Zhang	Pukyong National University (Fellow, Agriculture/Fishery)

The Association of Academies and Societies of Sciences in Asia (AASSA)

The Association of Academies and Societies of Science in Asia is a non-profit international organization with science, technology and innovation (STI) interests. It consists scientific and technological academies and science societies in Asia and Oceania. It was launched in 2012 through the merger of two organizations, i.e., AASA (Association of Academies of Sciences in Asia, founded in 2000) and FASAS (Federation of Asian Societies and Academies of Sciences founded in 1984). Its current membership is 33 national academies and societies of sciences from 30 countries and one regional academy of engineering and technology.

The principal objective of AASSA is to act as an organization in Asia and Oceania which plays a major role in the development of the region through science and technology. AASSA serves as a forum to discuss and provide advice on issues related to science and technology, research and development, and the application

of technology for socio-economic development.

The AASSA is also the only IAP Affiliated Regional Network for Asia of the IAP for Science to conduct a long-term project for sustainable development in Asia and seek cooperation with other continental partners such as EASAC (Europe) / IANAS (America) and NASAC (Africa)

The KAST has operated the AASSA Secretariat since its launch in 2012. While actively engaging in AASSA activities as a member, KAST is sharing with the world the experiences of Korea, a country that successfully rose from being one of the world's poorest nations to joining the ranks of the developed countries. In 2019, AASSA held four Regional Workshops in India, Sri Lanka, Pakistan and Republic of Korea, where, as the regional head of the global project led by the IAP, it presented a roadmap for sustainable growth in Asia and made an effort to solve common issues based on exchange and cooperation among members in Asia.



Cooperation with Academies of Other Countries

The KAST contributes to national science and technology globalization by hosting international symposiums on issues of common interest and pending issues, where distinguished scholars and members of foreign academies gather together.

Bilateral Symposia

UK-Korea Research Conference

Date	May. 28 (Tue) ~ May. 30 (Thu), 2019
Venue	Kavli Royal Society International Centre (UK)
Topic	Materials Science, Neuroscience
Attendees	50 scholars from the Royal Society, the KAST and Institute for Basic Science (IBS)

**\* Bilateral relations with the Royal Society**

The KAST and the Royal Society signed an MoU in 1998 and have held a series of joint symposiums since then. The UK-Korea Research Conference was held as a joint academic event along with the KAST, the IBS, and the Royal Society.



The 4<sup>th</sup> Korean-American Kavli Frontiers of Science Symposium

Date	Jun. 18 (Tue) ~ Jun. 20 (Thu), 2019
Venue	Incheon Paradise City
Attendees	80 young scientists in the US and Korea

**\* Bilateral relations with the National Academy of Science**

The KAST and the National Academy of Sciences (NAS) held their first joint symposium in 2002 and have continued to extend bilateral relations. The two sides have held KFoS Symposium on a regular basis since 2013.



Cooperation Meeting with Overseas Academies

Nobel Media AB

‘Nobel Prize Dialogue Seoul 2020’ Contract Signing Ceremony

Date	Jun. 14 (Fri), 2019		
Venue	Stockholm, Sweden		
Attendees	(Korea)	Min-Koo Han	KAST President
	(Sweden)	Lars Heikensten Laura Sprechmann	Nobel Foundation Secretary General Nobel Media CEO
Description	• Decided to hold ‘Nobel Prize Dialogue Seoul 2020’ under the theme of ‘The Future of Learning’		



Israel Academy of Sciences and Humanities (IASH)

KAST-IASH delegation meeting and re-signing of MoU

Date	Jul. 17 (Wed), 2019		
Venue	Grand Hyatt Seoul		
Attendees	(Korea)	Min-Koo Han Sung-jin Kim	KAST President Vice President for Academic Affairs (prof., Ewha Womans Univ.)
	(Israel)	Nili Cohen David Harel	IASH President IASH Vice President
Description	• Discussed measures to promote KAST-IASH cooperation, exchanges, and the hosting of joint symposiums, Held a signing ceremony of an amended MoU		

Chinese Ministry of Science and Technology (中華人民共和國科學技術部)

Visit of Chinese delegation and Joint Meeting

Date	Dec. 27 (Fri), 2019		
Venue	KAST Hall		
Attendees	(Korea)	Myung-Chul Lee	KAST Chairman
		Jin-Ho Chung	Executive Vice President
		Hoguen Kim	Professor emeritus, Yonsei University (Vice President for Publications)
		Tai Hyun Park	Professor, Seoul National University (Division Chairs for Engineering)
		Changmo Sung	Collaboration professor, Korea University (Policy Research Institute Director)
		Junghan Yoon	Professor emeritus, Hallym University (Chair of Y-KAST)
	(China)	Wang Zhi-gang	Minister of Science and Technology (MOST)
		Ye Dong-bai	MOST Director of Int'l Cooperation Dept.
		Xu-jing	MOST Director of Strategy and Planning Dept.
		Lin Xin	MOST Director of Policy, Regulation and Innovation System
		Wu Yuan-bin	MOST Director of Science and Technology for Social Development
		Fu Gui	Embassy of the People's Republic of China in ROK councilor
Description	• Introduced innovative growth strategies of Korea and discussed measures for bilateral exchange and cooperation		



International Symposium

KAST hosts international symposiums where Nobel laureates and eminent professors serving as academy members of each country gather together to exchange the latest research outcomes and discuss issues of the global S&T community each year.

The 35<sup>th</sup> KAST International Symposium

A Gate to the Future of Theranostics

Date	Mar. 1 (Fri), 2019
Venue	The Shilla Jeju
Speakers	• 20 world-renowned medical scientists specializing in Theranostics

The 36<sup>th</sup> KAST International Symposium (KAST-NAMOK joint international symposium)

Future Medicine

Date	Sep. 27 (Fri), 2019
Venue	Myeong-Hak Hall, Cheonnam National University Medical School
Speakers	• 19 medical scientists at Korea and abroad

The 37<sup>th</sup> KAST International Symposium

Opportunities and Challenges on Marine Food Security in the Northwestern Pacific Ocean

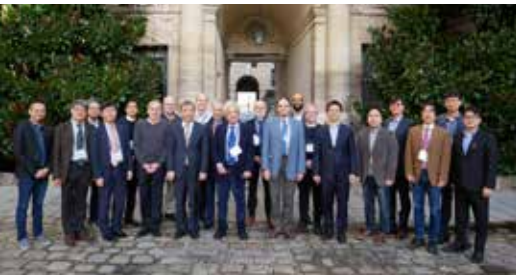
Date	Nov. 4 (Mon), 2019
Venue	Paradise Hotel Busan
Speakers	• 11 experts specializing in marine food and security science



Networking with World-leading Scientists

The KAST helps Korean scholars network with their global peers and thereby expand their international influence in the field of science and technology by supporting academic exchanges with international organizations and inviting distinguished scholars from overseas.

The Academy offers individual scholars a rare opportunity to participate inaccessible programs such as Frontier Scientists Workshop, the Lindau Nobel Laureate Meetings, Prestige Workshop, and international scholar exchange programs.



Frontier Scientists Workshop

No.	Date	Venue	Topic	Speakers
17th	Jun. 14 (Fri)	Piperska Muren (Stockholm, Sweden)	Sustainable Energy and Chemistry	10 scientists in Korea and Sweden including Prof. Sven Lidin of Lund Univ.
18th	Jul. 17 (Wed) ~ 19 (Fri)	Imperial College (London, UK)	Sustainable Energy Source for the Next Generation	13 scientists in Korea and the UK including Prof. James Durrant of Imperial College London (Fellow of the Royal Society)
19th	Nov. 7 (Thu) ~ 8 (Fri)	French Academy of Sciences (Paris, France)	Sustainable Materials, Chemistry and Energy	18 scientists in France, Sweden, Korea including Prof. Albert Fert of Université Paris-Sud
20th	Nov. 23 (Sat)	University of Hawaii (Hawaii, US)	Bioactive Compounds, Nanoparticle and Disease Prevention	13 scientists in Korea and the US including Prof. Bruce Hammock of Univ. of California, Davis
21st	Dec. 6 (Fri)	Harvard University (Boston, US)	Frontier Nanotechnology: 2D Materials and Beyond	14 scientists in Korea and the US including Prof. James Hone of Columbia Univ.

Prestige Workshop

No.	Date	Venue	Topic	Speakers
33rd	May. 16 (Thu)	Seoul	Recent Trends in Stress Response Signalling Pathway	8 scholars including Prof. Yoshito Kumagai of Univ. of Tsukuba





ACTIVITIES

# Awards

The KAST contributes to enhancing the morale of people engaged in science and technology by selecting and awarding the best researchers in respective fields of basic and applied sciences





The KAST administers various award programs to recognize and encourage scientists and engineers who have made outstanding achievements in their academic fields. In 2019, the following awards were presented: △Young Scientist Award, to identify and encourage young and talented scientists and engineers in the field of engineering science; △Daesang-KAST Food Science Award, to support outstanding scientists and engineers in food science; △S-Oil Excellent Dissertation Awards, to select talented researchers with academic passion and who have made outstanding research outcomes,

in order to foster them to become the leaders of our society in the next generation; △S-Oil Next Generation Scientists Awards, for top-notch scientists who are 45 years of age or under. Thanks to our efforts, the S-Oil Next Generation Scientists Award was launched this year to select promising scientists with outstanding research outcomes in the fields of physics, chemistry, physiology and medicine, and materials engineering, and to provide research funds in order to further solidify the foundations of basic science research.

## Young Scientist Award (Presidential Award)

Purpose	To reward young and talented scientists and engineers 40 years of age or under who have accomplished outstanding research and development achievements in the field of natural science and engineering. Awarded directly by the president in order to promote morale for research and development and to foster leading talents who will take a pivotal role in the field of the national science and technology of the 21st century.
Number of awardee	4 persons

### 2019 Young Scientist Presidential Awardees

	Awardee Major Achievements	<b>Woo Jong Yu</b> , <a href="#">Professor, Sungkyunkwan University</a> <ul style="list-style-type: none"><li>Developed, for the first time in the world, a semiconductor transistor which is 10 times thinner and has a 50 times stronger optical power conversion efficiency compared to existing ones through vertical alignment of nano new materials, such as graphene and MoS2</li></ul>
	Awardee Major Achievements	<b>Junsuk Rho</b> , <a href="#">Professor, POSTECH</a> <ul style="list-style-type: none"><li>Developed original technology of next generation encryption in display by taking the lead in the development of nano technologies, including metamaterials, known as a dream-like technology</li></ul>
	Awardee Major Achievements	<b>Shin-Hyun Kim</b> , <a href="#">Professor, KAIST(Y-KAST member, Engineering Division)</a> <ul style="list-style-type: none"><li>Recorded outstanding results in materials research, including research on soft materials, which can form fine particles of colloidal photonic crystals in large surface areas</li></ul>
	Awardee Major Achievements	<b>Jun Hong Noh</b> , <a href="#">Professor, Korea University</a> <ul style="list-style-type: none"><li>Pioneered research to develop metal halide perovskite solar cells that are considered to have the world's best efficiency, based on high-efficiency, next-gen energy conversion technology</li></ul>

## Daesang-KAST Food Science Award

Purpose	To promote the morale of scientists and engineers and find a candidate who has excellent research and development achievements in the field of food science
Number of awardee	1 person
Sponsorship	<b>Daesang Corporation</b> , is one of the three major fermentation companies in the world, and is a general food company which has 25 domestic and overseas subsidiaries.

### 2019 Daesang-KAST Food Science Awardee







	Awardee Major Achievements	<b>Jong-Whan Rhim</b> , <a href="#">Professor, Kyung Hee University (Fellow, Agricultural/Fishery Sciences)</a> <ul style="list-style-type: none"><li>Contributed for the development of product packaging for foods, pharmaceuticals, and cosmetics by conducting a research on packing materials including injections of biodegradable nanomaterials for more physical strength and tightened gas barriers and adding new functions based on antioxidant, antibacterial, and ultraviolet-protective properties</li></ul>
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S-Oil Next Generation Scientists Awards

Purpose	To encourage scientists who are 45 years of age or under working at domestic universities or research institutes with outstanding research outcomes in 6 areas including physics, chemistry, physiology or medicine, chemical/materials engineering, energy, and IT
Number of awardee	6 (one for each six fields)
Sponsorship	<b>S-OIL Science Culture Foundation</b> , is a public foundation established by S-OIL in 2011 to train talented people through international exchange activity, scholarship business, and research support for social return of the company's profit.

The 1st S-Oil Next Generation Scientists Award Awardees

Physics		Awardee Major Achievements	<b>Yong-il Shin</b> , <a href="#">Professor, Seoul National University (Y-KAST member, Engineering)</a> <ul style="list-style-type: none"><li>Led the related research area by exploring universality of turbulence phenomenon based on the observation of superfluid turbulence without viscosity similar to that of classical fluid</li></ul>
Chemistry		Awardee Major Achievements	<b>Soo Min Kim</b> , <a href="#">Researcher, KIST</a> <ul style="list-style-type: none"><li>Newly devised 'self-collimation' in crystal grain on liquid substrate escaping from previous concept of epitaxial growth of single-crystal thin films in single crystal substrate</li></ul>
Physiology or medicine		Awardee Major Achievements	<b>Won-Il Jeong</b> , <a href="#">Professor, KAIST</a> <ul style="list-style-type: none"><li>Defined 'Bidirectional loop signaling' between interstitial cell and hepatic stellate cell and presented a new concept of 'Neurologic Liver'</li></ul>
Chemistry · Material engineering		Awardee Major Achievements	<b>Jae Hyung Park</b> , <a href="#">Professor, Sungkyunkwan University (Y-KAST member, Engineering)</a> <ul style="list-style-type: none"><li>Conducted studies on stimuli-responsive biomaterials that might lead to effective diagnosis or treatment of intractable diseases such as cancer, arthritis, arteriosclerosis, hepatocirrhosis</li></ul>
Energy		Awardee Major Achievements	<b>Jangwon Seo</b> , <a href="#">Researcher, Korea Research Institute of Chemical Technology (KRICT)</a> <ul style="list-style-type: none"><li>Conducted research on organic/inorganic perovskite solar cell material and solar cell component application, and successfully developed and transferred 'high-efficiency perovskite solar cell' technology</li></ul>
IT		Awardee Major Achievements	<b>Sungeui Yoon</b> , <a href="#">Professor, KAIST</a> <ul style="list-style-type: none"><li>Led the research on Monte Carlo Ray Tracing for realistic image and significantly contributed to the commercialization of the technology</li></ul>

S-Oil Excellent Dissertation Awards

Purpose	To encourage young scientists who are striving for research in the field of the basic science of Korea, contributing to the promotion of the basic science research of Korea, and foster excellent talents that will become the leaders of our society in the next generation.
Number of awardee	Grand prize and Excellence award in 5 fields: Mathematics, Physics, Chemistry, Biology and Chemistry ·Material engineering. 20 persons in total including 1 advisor each
Sponsorship	<b>S-OIL Science Culture Foundation</b>

The 9th S-Oil Excellent Dissertation Awards Awardee

Field	Category	Awardee (school)	Advisor (school)	Title of Thesis
Mathematics	Grand Award	<b>Jeongho Kim</b> (Seoul National University, SNU)	<b>Seung-Yeal Ha</b> (SNU)	On the fluid coupling and hydrodynamic limit of the kinetic thermomechanical Cucker-Smale equation
	Excellence Award	<b>Yehyun Kwon</b> (SNU)	<b>Sanghyuk Lee</b> (SNU)	Sharp estimates for singular multiplier operators on Lebesgue spaces
Physics	Grand Award	<b>MyungJae Lee</b> (SNU)	<b>Hyunsoo Chung</b> (SNU)	Experimental verification of photonic band-tail states and their use for shaping laser properties
	Excellence Award	<b>Seung-Hun Lee</b> (Pukyong National University)	<b>Jae-Won Jang</b> (Pukyong National University)	Investigation of physical properties at metal-semiconductor nanostructure interface
Chemistry	Grand Award	<b>Yoonsu Park</b> (KAIST)	<b>Suk-Bok Chang</b> (KAIST)	Mechanism-Driven Approaches to Site-and Enantioselective C-H Amidation Reactions by Developing Robust Nitrene Precursors
	Excellence Award	<b>June-Eun Park</b> (SNU)	<b>Jwa-Min Nam</b> (SNU)	Highly Controlled Synthesis and Optical Properties of Cubic Plasmonic Nanostructures
Life Science	Grand Award	<b>Jinhee Baek</b> (KAIST)	<b>Jaeseung Jeong</b> (KAIST)	Neural mechanism underlying eye movement desensitization and reprocessing for post-traumatic stress disorder in mouse model
	Excellence Award	<b>Heeju Ryu</b> (SNU)	<b>Yeonseok Chung</b> (SNU)	Regulation of Autoantibody Responses in Hyperlipidemia
Chemistry · Materials engineering	Grand Award	<b>Ki-chang Kwon</b> (SNU)	<b>Ho Won Jang</b> (SNU)	Synthesis of atomically thin transition metal disulfides for photovoltaics and water splitting catalysts
	Excellence Award	<b>Yoon Seok Choi</b> (KAIST)	<b>WooChul Jung</b> (KAIST)	Ceria-based Electrode for Direct-hydrocarbon Utilization in Solid Oxide Fuel CEll



## ACTIVITIES

# Support Programs

KAST

The KAST plays a major role in creating a social climate where scientists and engineers are respected. The KAST will do its best to ensure that people in science & technology, the foundation of Korea's national competitiveness, are well-respected in our society so that they can devote themselves to R&D with high pride and confidence.

The KAST is responsible for the implementation of the 'Persons of distinguished service to science and technology' and carries out activities to select and support persons who greatly contributed to scientific advances in Korea. In this way, the KAST is taking the lead in raising the honor and pride of scientists and engineers and building a social and cultural environment where they are respected.

In addition, the KAST selects promising young scientists under 45 years of age as members of the Young Korean Academy of Science and Technology (Y-KAST). The KAST supports their efforts to establish exchanges with overseas Young Academies and to make science policy recommendations, in order to strengthen their leadership competencies both at home and abroad.

## Persons of distinguished service to science and technology

The Korean government designates persons with distinguished merits in the contribution to national scientific and technological development, among those people in the science and technology area, engaged in R&D and technological innovation activities according to the enforcement decree of the 'ACT ON THE HONORABLE TREATMENT OF, AND SUPPORT FOR, PERSONS OF DISTINGUISHED SERVICE TO SCIENCE AND TECHNOLOGY(Act No. 13579)' enacted on December 22, 2015 .

The KAST was selected as the competent authority for the 'Project on the honorable treatment and support for persons of distinguished service to science and technology' in 2016. The KAST selected 32 persons of distinguished service who led the development of the Republic of Korea in 2017, followed

by selecting 16 persons in 2018, and have been protecting the honor of scientists and engineers.

In 2019, the KAST designated 12 scientists and engineers, who had received the accolades of their fellow scientists and engineers and the respect of the Korean citizens, as the 'persons of distinguished service to science and technology in 2019.' In addition, the KAST organized 'lectures from persons of distinguished service to S&T' to pass down their rich research experience and accumulated knowledge to young scholars. And we published 'policy recommendations by persons of distinguished service to S&T' to consult for the establishment of national policies on science and technology. And we provide honorable treatment and convenience with dignity and formality for persons of distinguished service to science and technology.



### 2019 Persons of Distinguished Service to Science and Technology (12 persons in total)

#### Natural science



**Decd. Dong-gil Park (1897~1983)**, Professor emeritus, Inha University

- Pioneer of Korean geological mineralogy
- Fostered junior researchers in Korean geology and led the establishment of the academic community



**Se-hee Park (1935~)**, Professor emeritus, Seoul National University

- Mathematician who established the foundation of Korean mathematics and enhanced its profile internationally
- Unification of analytical fixed point theorems in non-linear analysis



**Decd. Sang-su Lee (1925~2010)**, Fmr. President, Korea Advanced Institute of Science (Cur. KAIST)

- Opticist who established the basis of Korean optics and contributed to the development of the Korean optics technology to the global level



Life science



**Decd. Tae-wan Kwon (1932~2017), Fmr. President, Korea Food Research Institute**

- Food scientist who leveled up the Korean food science infrastructure to the global standard
- Developed improved storerooms and rice processing complexes and modernized the Korean rice management system



**Young-choong Kim (1946~), Professor emeritus, Seoul National University**

- Pioneer of the leap and renaissance of the natural substance industry
- Women Scientist who prepared the conservation and utilization foundation for native plant resources



**Decd. Woo-choo Lee (1918~2007), Fmr. President, Yonsei University**

- Frontier who established Korean basic medicine and published globally renowned achievements in pharmacology
- A world renowned leader in neurohormone research and defined the role of heart and catecholamine in the autonomic nervous system



**Decd. In-Gyu Han (1934~2019), Professor emeritus, Seoul National University**

- Animal nutritionist who greatly developed the educational research and opened the international horizon of Korean zootechny
- Modernized the animal industry by converging animal life science and nutritional science into the livestock industry

Engineering



**Young-gul Kim (1930~), Professor emeritus, POSTECH**

- Chemical scientist who contributed to the international recognition of Korean catalysis research and to the globalization of Korean chemical engineerin



**Decd. Jeong-sik Kim (1929~2019), Fmr. Chairman, Daeduck Electronics**

- Pioneer of electronics industry who fostered Korean electronic parts to become the best in the world
- Contributed to the advancement of electronics production technology by developing Korean digital appliances to the globally recognized level



**Chung-gi Kim (1942~), Professor emeritus, KAIST**

- Pioneer of Korean semiconductor industry who Contributed to the technological development of semiconductors and digital equipment via path-finding vision and research



**Chung-gu Lee (1945~), Fmr. CEO, Hyundai Motors**

- Engineer who created a quantum leap of the Korean automotive industry's technological development
- Led the in-house development of 34 car models, from the Pony to the Equus

Convergence



**Decd. Si-Jung Kim (1932~2017) Professor emeritus, Korea University**

- S&T administrator who lead the aerospace and marine technologies in Korea
- Major projects include the construction of the leo-do Comprehensive Ocean Science Base and the development of the Smart Nuclear Reactor

Issuance of stamps to commemorate 'Korea's leading science and technology'

The Korea Post issued 8 commemorative stamps under the theme of a grand journey of Korean science and technology, with each stamp representing key scientific advancements (including the development of unification rice, integrated steelmaking process, ship design and construction technology, DRAM memory chip, the Hantavirus vaccine, Wooribyu satellite, reactor design technology standards, and the lithium-ion battery).



Great achievements of Persons of Distinguished Service to Science and Technology exhibited in Cheonggyecheon

Science breakthroughs made by 48 persons of distinguished service to science and technology were illustrated in panels and displayed along the Cheonggyecheon Stream in Seoul (from the Gwangtong Bridge and to the Gwanggyo Bridge) during the 2019 Korea Science Festival, from Apr. 20 to Apr. 23, to help people better understand their achievements. The exhibition was particularly popular with family visitors, who showed a considerable interest in the contents displayed.



Publication a book about the meritorious records of Persons of Distinguished Service to Science and Technology

The book is compiled as a critical biography of the first generation of Koreans distinguished in the field of science and technology, including a biography, their research achievements, media contributions and interviews, and the writings of each individual. It also provides a wealth of additional reading materials, including tributes written by the next generations of scholars and special contributions by science historians. An image book, consisting of easy-to-read information cards describing episodes in the early lives



and the careers of these distinguished individuals was also released.

Opening a Cyber Hall of Fame of science and technology figures

The Cyber Hall of Fame introduces individuals who have demonstrated distinguished service to each field of science and technology, along with the 100-year

history of Korean science and technology, describing their great achievements in chronological order.

Young Korean Academy of Science and Technology (Y-KAST)

Since 2017, the KAST have been selecting outstanding young scientists under the age of 45 as members of the Y-KAST and supporting their exchanges with Young Academies of other countries.

In 2019, KAST selected 26 distinguished young scientists to lead science and technology in Korea. The KAST strives to strengthen their

research competencies and promote global leadership through active exchanges with overseas young academies. We are also carrying out policy recommendations for domestic decision makers with bright new ideas and creative insights from young scientists who are invigorating the Korean science and technology community.

Y-KAST Executive Committee for 2019–2021

General



**Junghan Yoon**  
Chair of Y-KAST  
Professor emeritus,  
Hallym University  
(Fellow, Agricultural/  
Fishery Sciences)

Division of  
Policy



**Sungjoo Lee**  
Vice Chair of Y-KAST  
Professor,  
Ajou University



**Chaewoon Oh**  
Committee member  
Senior Researcher,  
Green Technology  
Center



**Woo Sung Jung**  
Committee member  
Professor,  
POSTECH

Division of  
Natural  
Sciences



**Tae-Young Yoon**  
Vice Chair of Y-KAST  
Professor,  
Seoul National  
University



**Tae-Lim Choi**  
Committee member  
Professor,  
Seoul National  
University



**Myoungjean Bae**  
Committee member  
Professor,  
POSTECH

Division of  
Engineering



**Ki Tae Nam**  
Vice Chair of Y-KAST  
Professor,  
Seoul National  
University



**Sooyoung Kim**  
Committee member  
Professor,  
Korea University



**Hyunjoo Lee**  
Committee member  
Professor,  
KAIST

Division of  
Agriculture  
and Fishery  
Sciences



**Kee Hoon Sohn**  
Vice Chair of Y-KAST  
Professor,  
POSTECH



**June Eun Lee**  
Committee member  
Professor,  
Seoul National  
University



**Dae-Hee Lee**  
Committee member  
Principal Researcher,  
Korea Research Institute of  
Biosciences & Biotechnology

Division of  
Medical  
Sciences



**Jinsung Kim**  
Vice Chair of Y-KAST  
Professor,  
Yonsei University



**Mi Hyun Kim**  
Committee member  
Professor,  
Gachon University



**Young Seok Ju**  
Committee member  
Professor,  
KAIST

Major activities in 2019



2019. 7. 4.

- Hosted the National Assembly–Y-KAST Policy Studies Meeting



2019. 10. 18.

- Hosted 2019 Y-KAST Members' Day



2019. 12. 11.

- The 2<sup>nd</sup> Y-KAST–Young Academy of Sweden Joint Symposium



2019. 12. 3.

- MSIT Minister–Young Scientists Meeting



New Members of Y-KAST in 2019

Division of Policy



**Michael K. Lim** Professor, Seoul National University

- Operations management
- Design and analysis of supply chains and logistics network



**Yongrae Cho** Research Fellow, STEPI

- Innovation theory and Information Analysis for Industrial Innovation strategy
- Network analysis based on Econometric Perspective

Division of  
Natural Sciences



**Seok Kim** Professor, Seoul National University

- Quantum field theory / • Black holes and quantum gravity



**Jae Kyoung Kim** Professor, KAIST

- Reduction of multi-timescale stochastic systems
- Mathematical modeling for circadian rhythms



**Hoi Ri Moon** Professor, UNIST

- Synthesis and Application Studies on Inorganic Porous Materials
- Synthesis and Characterization of Novel Metal–Organic Frameworks



**Je-Min Choi** Professor, Hanyang University

- Pathogenic function of Bystander T cells in autoimmune disease
- Therapeutic study in autoimmune multiple sclerosis by T cell regulatory protein



**Yoo-Geun Ham** Professor, Chonnam National University

- Development of Climate Prediction System / • Climate Change Research

Division of Engineering



**Yong-Mook Kang** Professor, Korea University

- Next-generation secondary batteries(Li, Na, K, Ca, Mg ion, Metal-air batteries) electrode materials
- Solid electrolyte materials



**Dong Sung Kim** Professor, POSTECH

- Polymer nano-manufacturing / • Electrospinning, Functional membrane



**Taek-Soo Kim** Professor, KAIST

- Solid Mechanics / • Mechanical Behavior of Materials



**Seok-In Na** Professor, JeonBuk National University

- Organic-inorganic solar cells / • Interface and surface engineering



**Ho Seok Park** Professor, SKKU

- 2D/Carbon energy nanomaterials
- Energy conversion & storage (batteries, supercapacitors, fuel cells)



**Jeong Min Baik** Professor, UNIST

- Contact-electrification-based energy harvesting materials and devices
- Metal-oxides based gas adsorption and sensing



**Changho Suh** Professor, KAIST

- Artificial intelligence and machine learning
- 5G communication system



**Joon Hyung Shim** Professor, Korea University

- Ceramic fuel cells and polymeric electrolyte membrane fuel cells
- Hydrogen and fuel electrolysis and synthesis



**Kwang Ho Lee** Professor, Korea University

- Heating and Cooling Energy in Buildings
- Renewable Energy Systems for Building Applications



**Minkee Choi** Professor, KAIST

- Design of nanoporous materials (zeolite, carbon, etc.)
- Catalysis and adsorption



**Seung Min Jane Han** Professor, KAIST

- Nanomechanics and reliability studies of materials
- High strength 2D nanolayerd composites



**Jeong Woo Han** Professor, POSTECH

- Computational Design of Catalysis and Energy Materials

Division of Medical Sciences



**Sangwoo Kim** Professor, Yonsei University

- Bioinformatics methods and algorithm development for genomic analysis
- Development of diagnostic and therapeutical techniques using cancer genomics



**Young Kook Kim** Professor, Seoul National University

- Early diagnosis of glaucomatous optic neuropathy based on imaging test, Surgical treatment of congenital Glaucoma



**Hye Young Kim** Professor, Seoul National University

- The pathogenesis of asthma and allergic disease
- Mucosal immune response and host defence



**Woong Mo Yang** Professor, Kyung Hee University

- Korean Medicines and biomaterials R&D
- Precision Korean Medicine, Standardized & customized diagnosis based on the Convergence of Korean and western medicines



**Dong Hun Lee** Professor, Seoul National University

- Skin Aging – Translational researches for its mechanism and control strategy
- Allergic skin disorders – Translational researches for their mechanism and novel treatment



**Yun-Hee Lee** Professor, Seoul National University

- Adipose tissue biology
- Molecular mechanisms of Obesity – related metabolic disease



**Sun Ju Chang** Professor, Seoul National University

- Care for vulnerable populations in healthcare (elderly and disabled populations)
- Health promotion behaviors



PEOPLE

# New Fellows of the KAST Elected in 2019



Division of Policy



**Zong-Tae Bae** Professor, KAIST

- Technology Innovation Management, R&D Strategy, Science & Technology Policy
- Entrepreneurship, Ecosystem, Social Entrepreneurship, Humane Entrepreneurship



**Jaeyong Song** Professor, Seoul National University

- Corporate strategy
- International Management



**Jeong Dong Lee** Professor, Seoul National University

- Productivity and Efficiency Analysis using Data Envelopment Analysis
- Technology Economics and Innovation Policy



**IL Im** Professor, Yonsei University

- Personalization systems/Recommender systems
- Technology adoption and impacts

Division of Natural Sciences



**Young-Hoon Kiem** Professor, Seoul National University

- Classification and moduli of algebraic varieties
- Intersection theory and invariants



**Sung Hee Baek** Professor, Seoul National University

- Epigenetic regulation of cancer, autophagy, stem cell, and inflammation
- Identification of the epigenetic code and epigenetic regulators in homeostasis and epigenetic diseases



**Han Woong Yeom** Professor, POSTECH

- Atomic Wires : self-assembled 1D metal and 1D topological insulator
- Atomic layers : epitaxially-grown single atomic layer 2D metals



**Jong-Sung Yu** Professor, DGIST

- Design & control of nano-structured materials and multi-scale composite structures
- Development of optimized PEM fuel cell electrocatalysts



**Young-Tae Chang** Professor, POSTECH

- Fluorescent Sensor and Molecular Imaging
- Chemical Cellomics



**Jang-Soo Chun** Distinguished Professor, GIST

- Molecular mechanisms of cartilage degeneration and osteoarthritis
- Development of therapeutic targets of osteoarthritis



**Haemyeong Jung** Professor, Seoul National University

- Tectonophysics and mechanism of rock deformation in the interior of the Earth
- Earthquake-triggering mechanism & seismic anisotropy in the crust and mantle

Division of Engineering



**Sang Ouk Kim** Professor, KAIST

- Directed Self-Assembly of Block Copolymers for Nanolithography
- Nanoscale Assembly & Chemical Modification of Graphene Based Materials



**Ki Dong Park** Professor, Ajou University, Korea

- Polymeric Biomaterials
- Drug Delivery System



**Kwan Young Lee** Professor, Korea University

- Automobile catalyst for super ultra low energy and emission vehicle
- Development and application of surface modified nanocatalyst



**Hyung Hee Cho** Professor, Yonsei University

- Heat transfer in high temperature components of gas turbine
- Meta materials/stealth technology in aviation infrared area



**Chang-Soo Han** Professor, Korea University

- Process and application of nanomaterials
- Biomimetic research of nanoscale nature



**Sungwoo Hwang** President, SAIT, Korea

- Electron transport in Nano-devices (with emphasis on graphene/2D material, silicon nanowire FETs, quantum dots, and molecules), Quantum transport, Single Electronics, Nano-fabrication, Meta-optics.

Division of  
Agricultural &  
Fishery Sciences



**Jihyun F. Kim** Professor, Yonsei University  
• Microbial Genomics and Metagenomics, Systems/Synthetic Biology, Genome Evolution, Microbiome Studies, Microbe-Host Interactions



**Doil Choi** Professor, Seoul National University  
• Structural and functional genomics of Solanaceae plants  
• Molecular mechanism of plant immunity

Division of  
Medical Sciences



**Wun-Jae Kim** Professor emeritus, Chungbuk National University  
• Personalized Tumor Engineering Research  
• Target based Diagnostics and Therapeutics Center for urological cancers



**Jae-Min Kim** Professor, Chonnam National University  
• Clinical & translational research for pathogenesis & personalized treatment of depression  
• Developing biointerface between body(physical disorder) and mind(mental illness)



**You Mie Lee** Professor, Kyungpook National University  
• Molecular and regulatory mechanism of angiogenic diseases  
• Investigation of mechanism and small molecules regulating HIF signaling and hypoxia microenvironment



**Seon Young Hwang** Professor, Hanyang University  
• Symptom management and self-care in patients with heart failure  
• Educational nursing intervention in patients with ischemic heart disease

PUBLICATIONS AND CHANNELS



Publications



**Policy study reports**  
published throughout the year by the KAST members on mid to longterm policies in science & technology.



**Next-generation Reports**  
provide opinions and ideas of young scientists and engineers.



**Voice of the KAST**  
published throughout the year by dealing with immediate policy suggestions on current issues in science & technology.



**Infographic Book**  
published to present the results of policy projects at a glance.



**Annual reports**  
published once a year by summarizing the status of the KAST and the results of projects.



**Window of the KAST**  
published 4 times a year as a magazine containing the philosophy and insight of the KAST.



**IN+SIGHT**  
is online newsletter issued twice a month by email which delivers the results of KAST projects and news on members real-time.

channels



**The KAST homepage**  
[www.kast.or.kr](http://www.kast.or.kr)  
As a site focusing on news and information of the KAST, it delivers  
▲Member information  
▲Project information  
▲Introduction of the KAST, and etc. in the fastest manner.



**Blog**  
[kast.tistory.com](http://kast.tistory.com)  
It is operated focusing on the results of projects and events of the KAST.



**Post**  
[post.naver.com/kast1994](http://post.naver.com/kast1994)  
It carries news, interviews, and etc. familiar with the public.



**Facebook**  
[www.facebook.com/kastnews](http://www.facebook.com/kastnews)  
It provides information on various events of the KAST.



**YouTube**  
It provides videos relating to lectures, discussions, and events.

Family sites

Young Korean Academy of Science & Technology ..... <http://y-kast.or.kr/>  
Association of Academies and Societies of Sciences in Asia ..... <http://aassa.asia/>  
Persons of Distinguished Service to Science & Technology of Republic of Korea ..... <http://koreascientists.kr/scientists/>

