

2012 INTER-ACADEMY SEOUL SCIENCE FORUM

Date	November 1(Thu) ~ 2(Fri), 2012
Venue	The Westin Chosun Hotel, Seoul, Korea
Main Theme	Innovation & Sustainability
Official Language	English
Website	http://www.iassf.or.kr
Host	The Korean Academy of Science and Technology

VENUE INFORMATION



The Westin Chosun Seoul is located in the heart of Seoul, where Prince Ko-Jong was known to perform a traditional ceremony (Jesa) to honor his ancestors. Since the beginning, this splendid hotel was used to house guests of state, dignitaries, foreign officials, as well as being the center of political, economic, and social gatherings. The Westin Chosun Seoul has survived throughout history and continues to provide first class service to its valued guests. The Westin Chosun Seoul promises to continue our century old tradition of being first and finest in the industry and to provide you with The Westin Chosun Seoul's unparalleled service and warm hospitality.

REGISTRATION

On-line registration is highly recommended through the official website at www.iassf.or.kr from September 20. The registration fee is free of charge. If on-line registration is not possible, please download the registration form through the website and send it to the secretariat via e-mail(iassf@aim-korea.com).

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IASSF

2012 INTER-ACADEMY SEOUL SCIENCE FORUM

INNOVATION & SUSTAINABILITY

2012 세계 과학한림원 서울포럼

NOVEMBER 1-2, 2012

THE WESTIN CHOSUN HOTEL, SEOUL, KOREA

Hosted by **KAST** 한국과학기술한림원
 The Korean Academy of Science and Technology

Sponsored by **교육과학기술부**
 MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY



GREETINGS FROM THE PRESIDENT, KAST



Dear esteemed colleagues and excellencies,
It is indeed an honor and privilege for me to invite you to the 2012 Inter-Academy Seoul Science Forum to be hosted by the Korean Academy of Science and Technology (hereinafter referred to as "KAST"). KAST has exerted its endeavor since its establishment in 1994 to expand multilateral academic exchanges and to strengthen international networks in close coordination with a number of scientific academies across the world.
Since the dawn of human civilization, science has always been a true guiding light which discovered truth about nature and man, thus gradually liberating humanity from false beliefs and physical pain.
It enabled us to envision the better world without oppression, hunger, and disease. The very apple of Issac Newton, which has also been an ancient symbol of intellectuality from the time of Bible, brought tremendous benefits to mankind in every field imaginable in the name of science and technology. Science holds the key to our survival, security, and prosperity more than ever.

This explains why this science forum is organized. We scientists are asked once again to find the answers to numerous dire problems of this era which require our concerted efforts such as sustainable economic development and growth, food supply, energy security, environmental conservation, and climate change effects.

Innovation in science and technology will be crucial to resolving the problems our world is facing; it is the only way to the future that can lead us to workable solutions to develop healthier crops, to create lifesaving medicines, to generate clean sources of energy and water, and to enjoy the fruits of economic development together with the less rich part of the world.

The scale of challenges being discussed here today forces us to combine our efforts in order to mitigate the impact of global issues. In this context, the Inter-Academy Seoul Science Forum is a particularly exciting opportunity to advance international coalition for solving various problems with the most brilliant scientific brains. We will share the understanding of the state-of-the-art issues of science and technology to build an international, interdisciplinary science network for active conversations bridging cultures and generations and to consolidate the ideas of the participants into a prudent strategy for sustainable development and growth.

I am confident that this forum will be a small but meaningful first step in sharing scientific benefits of our time and solidifying our science and technology cooperation. I hope this occasion to serve as a lead up to more proactive exchanges and successful outcomes. I am pleased that we have started to move forward. We look forward to seeing you at the 2012 IASSF in November and wish you a productive meeting and memorable moments in Korea.

Sincerely yours,

Kil Saeng Chung

President, The Korean Academy of Science & Technology

GREETINGS FROM ORGANIZING COMMITTEE

Dear distinguished scientists,

On behalf of the Organizing Committee, I would like to welcome you to the 2012 Inter-Academy Seoul Science Forum to be held in Seoul, from November 1 to 2, 2012 at Westin Chosun Hotel in Seoul, Korea, hosted by The Korean Academy of Science and Technology (KAST).

The more interdependent this world becomes, the greater the need for synergistic interaction among different fields is. The current situation encourages us to stand together to come up with effective resolutions to the global issues of today in regard to food shortage, energy supply, environment conservation, health management, and poverty. In this regard, IASSF takes the initiative in integrating the insights of world scientists and providing a sound strategy for the better world of sustainable growth and development.

It is also designed to provide a platform for inter-disciplinary interaction with a range of scientists in the world to share and discuss the pressing scientific issues. The aim of the Forum is to exchange and explore the frontiers of scientific research with eminent scholars of their fields from all around the world and to discuss the strategy for sustainable development with the help of science and technology.

I thank all members of the Organizing Committee for their dedication and contribution to ensuring that this conference is fruitful and worthwhile for all participants. I thank KAST for this wonderful opportunity to exchange our understanding on the recent scientific findings and products and to further international Science and Technology cooperation and camaraderie.

I hope your stay in Korea full of rich academic interactions and pleasant personal memories. Once again, I would like to thank all of you for your proactive support and participation.

I look forward to meeting you in the beautiful city of Seoul in November 2012.



Sincerely yours,

Sung - Hou Kim

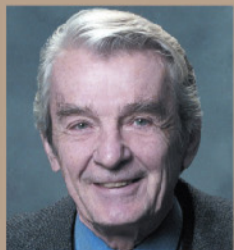
President of Organizing Committee

2012 IASSF ORGANIZING COMMITTEE

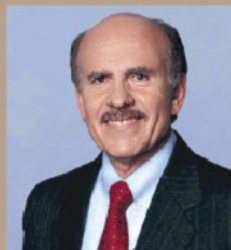
Organizing Committee	President	Prof. Sung-Hou Kim University of California, Berkeley
Steering Committee	Chairman	Prof. Yoo Hang Kim Executive Vice President, KAST
Members	Physics	Prof. Yung Woo Park, Seoul National University
		Prof. Changhee Lee, Seoul National University
	Chemistry	Prof. Taeghwan Hyeon, Seoul National University
		Prof. Jwa-Min Nam, Seoul National University
	Medicine & Life Science	Prof. Jeong-Sun Seo, Seoul National University
		Prof. Jongil Kim, Seoul National University
Prof. Uhtaek Oh, Seoul National University		
		Prof. Jongkyeong Chung, Seoul National University

SPEAKERS

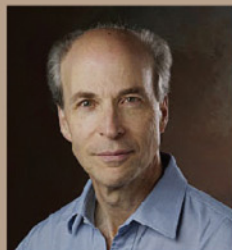
FEATURED SPEAKERS



IVAR GIAEVER
Professor Emeritus,
Rensselaer Polytechnic Institute
1973 Nobel Prize in Physics



LOUIS IGNARRO
Professor
Dept. of Pharmacology UCLA
School of Medicine
1998 Nobel Prize in Medicine



ROGER KORNBORG
Professor
School of Medicine,
Stanford University
2006 Nobel Prize in Chemistry



DAN SHECHTMAN
Philip Tobias Professor
of Materials Science
The Technion Israel Institute of Technology
2011 Nobel Prize in Chemistry

PHYSICS

Moo Young Choi	Seoul National University
Tord Claeson	Chalmers University of Technology
Astrid Gröslund	Stockholm University
Börje Johansson	Uppsala University / KTH - Royal Institute of Technology
Antoine Kahn	Princeton University
Feodor V. Kusmartsev	Loughborough University
Kyoung Jin Lee	Korea University
Eugene Mele	University of Pennsylvania
Hongkun Park	Harvard University
Yung Woo Park	Seoul National University
Soo Young Park	Seoul National University
Han Woong Yeom	Pohang University of Science and Technology
Kyung Hwa Yoo	Yonsei University

CHEMISTRY

Jinwoo Cheon	Yonsei University
Insung S. Choi	Korea Advanced Institute of Science and Technology
Hee Cheul Choi	Pohang University of Science and Technology
Byunghee Hong	Seoul National University
Taeg Hwan Hyeon	Seoul National University
Jwa-Min Nam	Seoul National University
Jiwoong Park	Cornell University
Dmitri Talapin	The University of Chicago
Peidong Yang	University of California, Berkeley

MEDICINE & LIFE SCIENCE

Yongwon Choi	University of Pennsylvania
Michael Clegg	University of California, Irvine
Eric Honore	Institut de Pharmacologie Moléculaire et Cellulaire CNRS
Chil-Yong Kang	The University of Western Ontario
Kwang-Soo Kim	Harvard Medical School
Sunghoon Kim	Seoul National University
Sung-Hou Kim	University of California, Berkeley
Changjoon Justin Lee	Korea Institute of Science and Technology
Hong Gil Nam	Daegu Gyeongbuk Institute of Science and Technology
Uhtaek Oh	Seoul National University
Woong-Yang Park	Seoul National University
Hee-Sup Shin	Institute for Basic Science
John Wood	University College London

INTER-ACADEMY ROUNDTABLE DISCUSSION

It is indeed a great honor for KAST to hold the Roundtable Discussion with Academy Representatives at the IASSF. As the first Inter-Academy Seoul Science Forum, the representatives will discuss the role of academies for future science & technology under the theme "The Role of Academies for Science Innovation." It will serve as a cornerstone to further share the experiences and visions of national academies around the world for science innovations and thus present the right direction of our concerted efforts for years to come.

Date & Time : November 2, Friday, 08:30 -10:30

Place : Lilac & Tulip (2F)

Event	
Opening	Prof. Hyun-Ku Rhee, Special Advisor to the President for Science and Technology
Welcome remarks	Prof. Kil-Saeng Chung, President, The Korean Academy of Science and Technology
Presentation	Germany : Prof. Ursula M. Staudinger, Vice President and Foreign Secretary, German National Academy of Sciences Leopoldina Title : "National Academies and the Demand for Science-Based Advice in Knowledge Societies" USA : Prof. Michael Clegg, Foreign Secretary, National Academy of Sciences, USA Title : "National Academies: Providing Science and Technology advice to the Nation" Korea : Dr. Won-Hoon Park, President, The Association of Academies and Societies of Sciences in Asia Title : "The Role of Academies of Sciences in Fostering Global Cooperation and Sharing Development of Science and Technology"
Discussion	Chairperson : Prof. Hyun-Ku Rhee, Special Advisor to the President for Science and Technology

ACADEMY REPRESENTATIVES



HYUN-KU RHEE
Special Advisor
to the President for
Science and Technology



WON-HOON PARK
President,
The Association of Academies and
Societies of Sciences in Asia



MARIE D'ORIO
President of Royal
Society of Canada
Academy of Science



CATHERINE BRÉCHIGNAC
Permanent secretary
of the French
Academy of Sciences



URSULA M. STAUDINGER
Vice President and Foreign Secretary,
German National Academy of
Sciences Leopoldina



KRISHAN LAL
President,
Indian National
Science Academy



KIL SAENG CHUNG
President,
The Korean Academy of
Science & Technology



BRITT-MARIE SJÖBERG
Vice-president,
The Royal Swedish Academy
of Sciences



MICHAEL T. CLEGG
Foreign Secretary,
National Academy of Sciences,
USA



INTER-ACADEMY SEOUL SCIENCE FORUM

INNOVATION & SUSTAINABILITY

Nov 1. THU	
08:30 - 09:20	Registration <i>GrandBallroom Foyer (1F)</i>
09:20 - 09:50	Opening Ceremony <i>GrandBallroom (1F)</i>
09:50 - 12:00	Plenary Lecture I <i>GrandBallroom (1F)</i> Moderators : Pres. Sung-Chul Shin (DGIST), Prof. Hun-Taeg Chung (Ulsan University) - Physics : Nanotechnology, Biology and Business <i>Prof. Ivar Giaever (Rensselaer Polytechnic Institute)</i> - Chemistry : The Molecular Basis of Eukaryotic Transcription <i>Prof. Roger Kornberg (Stanford University)</i> - Medicine & Life Science : Nitric Oxide as a Unique Gaseous Signaling Molecule in Biology <i>Prof. Louis Ignarro (UCLA School of Medicine)</i>
12:00 - 13:30	Luncheon <i>GrandBallroom (1F)</i>
13:30 - 18:00	Session 1 <i>Lilac & Tulip (2F)</i> Physics (1A) : Nano Bio Information and Cognitive (NBIC) Sciences Chairperson : Prof. Yung Woo Park (Seoul National University) SESSION 1A-1 Superconducting Devices for Basic Studies : Examples from Chalmers <i>Prof. Tord Claeson (Chalmers University of Technology)</i> Biophysical studies of the amyloid β peptide involved in Alzheimer's disease <i>Prof. Astrid Gräslund (Stockholm University)</i> Patterns and waves in populations of biological cells <i>Prof. Kyoung Jin Lee (Korea University)</i> SESSION 1A-2 Chairperson : Prof. Hongkun Park (Harvard University) Organic Electronics: a fast-developing world of interfaces <i>Prof. Antoine Kahn (Princeton University)</i> Topological Physics in Band Insulators <i>Prof. Eugene Mele (University of Pennsylvania)</i> Manipulating Energy and Electron Transfer Processes in Luminescent Molecular System : Innovation in the Materials Design <i>Prof. Soo Young Park (Seoul National University)</i> Discussion Chemistry (1B) : Materials Chemistry and Nanoscience <i>Cosmos & Violet (2F)</i> SESSION 1B-1 Chairperson : Prof. Jinwoo Cheon (Yonsei University) Design of Functional Materials using Nanocrystal Building Blocks <i>Prof. Dmitri Talapin (The University of Chicago)</i> Large-scale Synthesis and Designed Assembly of Uniform-sized Nanocrystals for Medical Applications <i>Prof. Taeg Hwan Hyeon (Seoul National University)</i> Discussion SESSION 1B-2 Chairperson : Prof. Jwa-Min Nam (Seoul National University) Synthesis of Large-Area Graphene for Display and Energy Applications <i>Prof. Byunghee Hong (Seoul National University)</i> Catalyst-free synthesis of single layer graphene and catalyst-assisted synthesis of a few layer MoS ₂ in large scale <i>Prof. Hee Cheul Choi (POSTECH)</i> Discussion Medicine & Life Science (1C) : Recent Advances in Medicine and Life Science <i>Orchid (2F)</i> SESSION 1C-1 Chairperson : Prof. Inhee Mook-Jung (Seoul National University) Recent Insights into Pain Mechanisms <i>Prof. John Wood (University College London)</i> T-type Ca ²⁺ Channels and Thalamic Firing Modes in Control of Consciousness and Cognition <i>Dr. Hee-Sup Shin (Institute for Basic Science)</i> Protein-based cellular alchemy to study and treat human diseases: another myth or reality? <i>Prof. Kwang-Soo Kim (Harvard Medical School)</i> SESSION 1C-2 Chairperson : Prof. Uhtaek Oh (Seoul National University) Glial, Neuron and Brain Function <i>Dr. Changjoon Justin Lee (KIST)</i> Mechanoprotection by polycystins against apoptosis is mediated through the opening of stretch-activated K _{2P} channels <i>Dr. Eric Honore (Institut de Pharmacologie Moléculaire et Cellulaire CNRS)</i> New Biology and Medicine Emerging from the Ancient Enzymes, "tRNA Synthetases" <i>Prof. Sunghoon Kim (Seoul National University)</i> Discussion
18:00 -	Welcome Dinner <i>GrandBallroom (1F)</i>

Nov 2. FRI	
08:00 - 10:20	Registration <i>GrandBallroom Foyer (1F)</i>
08:30 - 10:30	Inter-Academy Roundtable Discussion <i>Lilac & Tulip (2F)</i> Chairperson : Prof. Hyun-Ku Rhee (Special Advisor to the President for Science and Technology) Theme : "The Role of Academies for Science Innovation"
10:30 - 12:30	Plenary Lecture II <i>GrandBallroom (1F)</i> Moderators : Prof. Young Ki Paik (Yonsei University), Prof. Taeg Hwan Hyeon (Seoul National University) - Quasi-Periodic Materials – A Paradigm Shift in Crystallography <i>Prof. Dan Shechtman (The Technion Israel Institute of Technology)</i> - Physics : Advanced Quantum Material Theory for the Future <i>Prof. Börje Johansson (Uppsala University / KTH - Royal Institute of Technology)</i> - Medicine & Life Science : A "Personalized" Drug against Metastatic Melanoma: successes and challenges <i>Prof. Sung-Hou Kim (University of California, Berkeley)</i>
12:30 - 14:00	Luncheon <i>GrandBallroom (1F)</i>
14:00 - 18:00	Session 2 <i>Lilac & Tulip (2F)</i> Physics (2A) : Nano Bio Information and Cognitive (NBIC) Sciences Chairperson : Prof. Soo Young Park (Seoul National University) Extraordinary magneto-resistance in graphene hybrids and its applications in nano-electronics and medicine <i>Prof. Feodor Kusmartsev (Loughborough University)</i> SESSION 2A-1 Vertical Nanowire Platform and Single-Cell Transcriptomics : Transformative New Tools for Biology <i>Prof. Hongkun Park (Harvard University)</i> Emergence of skew distributions in natural and social systems <i>Prof. Moo Young Choi (Seoul National University)</i> SESSION 2A-2 Chairperson : Prof. Kyoung Jin Lee (Korea University) Topological Solitons in Atomic Wires <i>Prof. Han Woong Yeom (POSTECH)</i> Capacitance-Based Assay for Real-Time Monitoring of Cellular Activities <i>Prof. Kyung Hwa Yoo (Yonsei University)</i> Discussion Chemistry (2B) : Materials Chemistry and Nanoscience <i>Cosmos & Violet (2F)</i> SESSION 2B-1 Chairperson : Prof. Taeg Hwan Hyeon (Seoul National University) Nanowire Technology and Terawatt Challenge <i>Prof. Peidong Yang (University of California, Berkeley)</i> Magnetic Nanoparticles as Probes and Actuators for Biomedical Sciences <i>Prof. Jinwoo Cheon (Yonsei University)</i> Plasmonic Nanogap Structures with ~1-nm Gap <i>Prof. Jwa-Min Nam (Seoul National University)</i> SESSION 2B-2 Chairperson : Prof. Hee Cheul Choi (POSTECH) Graphene and Boron Nitride for Atomically Thin Circuitry <i>Prof. Jiwoong Park (Cornell University)</i> Artificial Spores: Cytocompatible Encapsulation of Individual Living-Cells <i>Prof. Insung S. Choi (KAIST)</i> Discussion Medicine & Life Science (2C) : Genome, Evolution and Diseases <i>Orchid (2F)</i> SESSION 2C-1 Chairperson : Prof. Chil-Yong Kang (The University of Western Ontario) How do plants age, senesce, and die? Genetic and systems understanding <i>Prof. Hong Gil Nam (Daegu Gyeongbuk Institute of Science and Technology)</i> Molecules to Ecology: The evolution of flower color genes <i>Prof. Michael Clegg (University of California, Irvine)</i> SESSION 2C-2 Chairperson : Prof. Uhtaek Oh (Seoul National University) A cure for AIDS? The most challenging problem of our time <i>Prof. Chil-Yong Kang (The University of Western Ontario)</i> Inflammation, Infection and Beyond: RANKL and Perspective on Osteoimmunology <i>Prof. Yongwon Choi (University of Pennsylvania)</i> Diagnostic application of exome sequencing for nonsyndromic hearing loss <i>Prof. Woong-Yang Park (Seoul National University)</i> Discussion
18:00 - 18:20	Inter-Academy Roundtable Wrap-up <i>GrandBallroom (1F)</i>
18:20 -	Farewell dinner <i>GrandBallroom (1F)</i>