

# **25-30, 2013 Tsukuba, Japar Addust**

# Words of Welcome

We are truly delighted and honored to welcome the world-distinguished scientists including five Nobel Laureates and more than 200 talented young students from all over the Asia to the Asian Science Camp 2013 (ASC 2013) in Tsukuba, Japan from August 25 to 30, 2013.

While the ASC 2013 comes to the 7th of the series of the Asian Science Camp, more than a thousand of young Asian students have experienced this unique and prominent program. This is our second opportunity to hold an ASC in Tsukuba since 2009. We are delighted to have Asian Science Camp again in Tsukuba to welcome such promising youths.

The ASC aims to enlighten those science-talented youths through discussion and dialogue with top scholars in the world and to promote the international friendship and cooperation among the best young students of the next generation in Asia. ASC 2013 is also devised with an interesting program of plenary lectures, parallel camps, poster presentations, social events and excursions. We hope each of you, taking advantage of all this opportunity, takes a step to the future of science, Asia, and yourself.

At the same time, if you can find, feel and experience pieces of Japanese culture during your stay, it is our great pleasure. These experiences lead us to the further mutual understanding and our good friendship.

At last, we would like to express our sincere gratitude to the founding fathers as well as International Advisory Committee members for leading us to the ASC, to the contact persons of each country/region working together for the success of ASC 2013, and all of participants getting together today. We are very excited to build up this event with all of you.

## Asian Science Camp 2013 Organizing Committee

Michiharu Nakamura Tsutomu Ueki Mitsuhiro Hirai Taisuke Kawasaki Osamu Kato Kozo Abe Mitsuhiro Ogawa Atsuto Suzuki Takeshi Komatsubara Leonard Chavas Takashi Ino Kazunori Itakura Yoshihito Iwasaki Mihoko Nojiri

# **I** Greetings

Both technology and scientific thinking give power to the human being. By combining them, we learn how various molecules govern our body, why the sun keeps burning, even the age of our Universe. More than affecting our life, the scientific knowledge has a direct influence on how we consider ourselves. Now, Mother Nature is hiding even deeper mysteries waiting that young scientists develop new technologies and take the opportunity to discover its secrets.

Modern science mostly started to develop in Western countries, and eventually spread all across the world. Hence, the potential capability owned by Asia in various areas of science has not yet been fully exploited. In this light, the Asian Science Camp aims to provide young people of Asian regions with a valuable opportunity to deepen their scientific knowledge and expand their horizons through close interactions with eminent scientists.

The International Advisory Committee is very pleased that ASC 2013 is being held in Japan again. This camp is the 7th of its kind. Participants of the first Camp back in 2007 must be graduated from their respective Universities by now, developing their skills in various directions. We sincerely hope the experience gained during this 2013 event will have a significant impact for all the participants attending.



Mr. Kolayahi

Makoto Kobayashi Acting Chairman Asian Science Camp International Advisory Committee

# About ASC

The Asian Science Camp 2013 (ASC 2013) is held from August 25 to 30, 2013 at Tsukuba International Congress Center "EPOCHAL TSUKUBA", Tsukuba, Japan, involving more than 200 students from all over Asian countries/regions. The participating students are those from high school (11th and 12th grade) and university (1st and 2nd year) who are selected as promising in science.

The idea of ASC was discussed in 2005 after the Lindau Science Meeting by Professor Yuan-Tseh Lee, the 1986 Nobel Laureate in Chemistry, and Professor Masatoshi Koshiba, the 2002 Nobel Laureate in Physics. The proposal aims to enlighten those science-talented youths through discussion and dialogue with top scholars in the world and to promote the international friendship and cooperation among the best young students of the next generation in Asia.

The ASC International Advisory Committee has approved that Japan hosts the ASC in 2013. Japan Science and Technology Agency (JST) and High Energy Accelerator Research Organization (KEK) take part in the organization.

ASC 2013 is the 7th of the series, following successful camps at Taipei (2007), Bali (2008), Tsukuba (2009), Mumbai (2010), Daejeon (2011), and Jerusalem (2012).



# **ASC 2013 Overview**

Title	÷	Asian Science Camp 2013
Date	:	August 25-30, 2013
Venue	:	Tsukuba International Congress Center "EPOCHAL TSUKUBA"
Programs	:	7 Lectures, 17 Camps, Group Activities, Poster Preparation & Presentation, Laboratory Visit & Excursion, Reception Party, Opening Ceremony, Group Orientation, Closing Ceremony, Farewell Party

Participants : Over 200 students and supervisors from 24 countries/regions in Asia

# **I ASC 2013 Organizations**

#### Asian Science Camp International Advisory Committee:

Makoto Kobayashi, Acting Chairman Yuan T. Lee, Co-Founder Masatoshi Koshiba, Co-Founder Rajagopala Chidambaram Leo Esaki Dong-Pil Min Ryoji Noyori Koichi Tanaka

#### Asian Science Camp 2013 Organizing Committee Co-Chaired by: Michiharu Nakamura, JST Atsute

Atsuto Suzuki, KEK

## Asian Science Camp 2013 Organizing Committee

#### **Members:**

Tsutomu Ueki, JST, Active co-chair Mitsuhiro Hirai, JST Taisuke Kawasaki, JST Osamu Kato, JST Kozo Abe, JST Mitsuhiro Ogawa, JST Takeshi Komatsubara, KEK, Active co-chair Leonard Chavas, IMSS, KEK Takashi Ino, IMSS, KEK Kazunori Itakura, IPNS, KEK Yoshihito Iwasaki, IPNS, KEK Mihoko Nojiri, IPNS, KEK

# **General Information**

#### Accommodation:

Okura Frontier Hotel Tsukuba, and Okura Frontier Hotel Tsukuba EPOCHAL Meals:

ASC lunches and dinners will be served at the Tsukuba International Congress Center "EPOCHAL TSUKUBA".

Breakfasts will be served at the Banquet Room "Jupiter" of Okura Frontier Hotel Tsukuba. Due to limited seating, we are unable to accommodate all the participants at the same time. Participants are kindly asked to have breakfast within the specified time frame as follows.

#### Participants staying at:

Okura Frontier Hotel Tsukuba 6:30-7:30

Okura Frontier Hotel Tsukuba EPOCHAL 7:00-8:00

#### Secretariat:

Room 304, 3rd floor, Tsukuba International Congress Center "EPOCHAL TSUKUBA" Aug 25 : from 9:00 to 21:00

Aug 26-30 : from 8:30 to 21:00

#### **Medical Room:**

A Medical Room will be set up to provide immediate health care and basic first-aid treatment. The location of the room and its operating hours are as follows.

Room 305, 3rd floor, Tsukuba International Congress Center "EPOCHAL TSUKUBA" Aug 25 : from 19:00 to 21:00

Aug 26-30 : from 8:30 to 21:00

#### Prayer Room:

Prayer Room will be available. The location of the room and their operating hours are as follows.

Room 306, 3rd floor, Tsukuba International Congress Center "EPOCHAL TSUKUBA"

Aug 25 : from 19:00 to 21:00

Aug 26-30 : from 8:30 to 21:00

#### **Ground Rules:**

All participants are required to abide by regulations and guidelines defined by the Organizing Committee.

# Participants should attend all sessions and activities on time.

# During sessions, all mobile phones must be turned off and picture taking is only allowed during break time. Participants should pay undivided attention to the program.

# Throughout the program, all participants must stay within the premises of the venue. They are not permitted to leave without reporting to the Organizing Committee.

# Do not smoke nor drink alcohol during the ASC 2013 event.

# Your dress may be casual, but should be clean, proper and neat.

# The Organizing Committee assumes no financial responsibility for lost items. Students should take precautions to protect personal belongings.

# Any participant who feels ill should inform the supervisor and the ASC staff of his or her health condition.

# I Map

# **Position of Tsukuba City**



# Vicinity Map of Epochal Tsukuba & Okura Frontier Hotels



# **Floor Plan**

# Tsukuba International Congress Center "EPOCHAL TSUKUBA"



08 | Floor Plan : Tsukuba International Congress Center "EPOCHAL TSUKUBA"



# **Time Table**

	Aug. 25 Sunday		Aug. 26 Monday			Aug	. 27 dav	
6:00								
7:00			6:30-8:00 Breakfast					
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			8:30-9:15			0.20	10.00	
9:00		M	lain Convention Ha	ıll	Lecture 3			
			9:15-10:45		Motoko Kotani Main Convention Hall			
10.00			Lecture 1 Ficichi Negishi			Bro	ak	
10:00		м	lain Convention Ha	ill.		DIE	dK	•••••••••••••••••••••••••••••••••••••••
			Break			10:15- Lectu	11:45 ure 4	
11:00				•••••••••••••••••••••••••••••••••••••••		Makoto K	obayashi	
			11:00-13:00					
12:00			Group Orientation & Lunch			Group	Photo	
		Multi-Purpose	Hall, Conference R	Room 101, 102		12:15-	13:00	
					F	oyer of Main C	Convention Ha	ıll
13:00			Break			Bre	ak	
			13:15-14:45		13:15-14:45			
14:00			Hitoshi Murayama		Leo Esaki			
		Μ	lain Convention Ha	ill -		Main Conv	ention Hall	
45-00			Break		Break			
15:00		15:00-16:15 Camp 1			15:00-16:15 Camp 3			
		Camp 1-1	Camp 1-2	Conference Room 406	Camp 3-1	Camp 3-2 Conference Room 202	Conference Room 406	Camp 3-4 Conference Room 405
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16:00	Arrival	Conference Room 201 Ei-ichi Negishi	Hitoshi Murayama	Motoko Kotani	Makoto Kobayashi	Hitoshi Murayama	Yuan T. Lee	Motoko Kotani
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	Aug. 28 Wednesday		Aug. 29 Thursday	Aug. 30 _ Friday	Aug. 31 Saturday
6:30-8:00 Breakfast <b>Jupiter</b>			6:30-8:00 Breakfast <b>Jupiter</b>	6:30-8:00 Breakfast Jupiter	6:30-8:00 Breakfast Jupiter
Move	e to EPOCHAL TSUK	(UBA	Get on bus	Move to EPOCHAL TSUKUBA	
N	8:30-10:00 Lecture 6 Ada E.Yonath Iain Convention Ha Break 10:15-11:45 Lecture 7 Yuan T. Lee Iain Convention Ha	11		8:30-12:00 Poster Preparation Conference Room 101, 102, 201	Departure
Break 12:15-13:00 Lunch Foyer of Main Convention Hall				12:00-12:45 Lunch <b>Conference Room 101, 102, 201</b> Break	
1	Break	5	9-20 10-00		
Camp 5-1 Conference Room 201 Leo Esaki	Camp 5-1         Camp 5-2         Camp 5-3           onference Room 201         Conference Room 202         Conference Room 406           Leo Esaki         Ada E.Yonath         Yuan T. Lee           Break         Kata K.Yonath         Kata K.Yonath		Lab.visit & Excursion	13:00-16:00 Poster Presentation & Discussions Fover of Main Convention Hall	
15:00-16:15 Poster Preparation <b>Conference Room 101, 102, 201</b>				royer of Main Convention Hail	
	Break			Break	
Confe	16:30-17:45 Poster Preparation rence Room 101, 10 Break	12, 201		17:00-18:00 Closing Ceremony <b>Main Convention Hall</b>	
18:00-19:00 Dinner Foyer of Main Convention Hall				Move to Okura Frontier Hotel Tsukuba	
Break 19:15-21:00 Poster Preparation Conference Room 101, 102, 201			19:00-20:00 Dinner Foyer of Main Convention Hall 20:00-21:00 Poster Preparation Conference Room 101, 102, 201	18:30-21:00 Farewel Party <b>Subaru</b>	
	Back to hotel		Back to hotel		
				Free time	
				Back to hotel	
			1		

# Lecture, Camp, Poster Presentation

#### Lecture

Seven plenary lectures will be given by the Leaders during August 26th, 27th and 28th. Each lecture is in 90 minutes, including the time for questions and answers in 30 minutes. Students should attend all the lectures.

## Camp

The "Camp" in ASC 2013 is a discussion session between students and one of the Leaders. Five Camp slots will be arranged during August 26th, 27th and 28th. In each slot, three to four Camps will be held in parallel. Each Camp is in 75 minutes. Students should attend all the Camp slots.

Each Camp will start with a short presentation by the Leader, followed by the discussion among the Leader and students. An Associate to each Leader, chosen from young Professors in the universities and institutes in Japan, will chair the Camp and help the Leader to stimulate the discussion.

The ASC 2013 students are divided into teams, five to six students in each, at the Group Orientation on Monday, August 26th. All the members of a team should attend the same Camp together in the slots. The ASC 2013 organizers decide which team should attend which Camp according to the requests submitted in the Group Orientation session.

Students should learn and get information on scientific knowledge through Lectures and Camps and prepare their own Posters in the unit of the team they belong to.

#### **Poster Presentation**

The team should work together, in particular in the Group Activity 1 on August 26th, and Poster Preparation sessions on 28th, 29th and 30th. The team will prepare one poster to be presented at the Poster Presentation session in the afternoon of Friday, August 30th.

Instructors and Assistants will help students in the Poster Preparation sessions.

The poster should contain the knowledge and information that students obtain through the Lectures and Camps, and be drawn up by handwriting and pasting printed pictures on an A0 size paper.

At the Poster Presentation session, a committee will review and select three posters for the Gold, Silver and Blonze awards. Members in each team should stand in front of their poster for the explanation. At the same time, students should also visit and review posters of other teams, and have a vote to determine the best poster(s) selected by themselves. Members in two to three groups will be awarded as "Best Players" based on the voting.

# **Leaders**



## Leo Esaki Nobel Laureate in Physics 1973

Leo Esaki was born on March 12, 1925 in Osaka, Japan. Studying physics at the University of Tokyo, he received his B.Sc. in 1947 and his Ph.D. in 1959. Esaki was awarded the Nobel Prize for research he had conducted around 1957 regarding electron

tunneling in solids. He moved to the United States in 1960 and joined the IBM T.J. Watson Research Center where he became an IBM Fellow in 1967 and stayed until he returned to Japan in 1992. He and his coworkers pioneered semiconductor superlattices, opening up a new frontier in the field of semiconductors when he was with IBM. After returning to Japan, he has served as the President of various Japanese universities, such as University of Tsukuba and Shibaura Institute of Technology, currently Yokohama College of Pharmacy as well as The Science and Technology Promotion Foundation of Ibaraki. He is the recipient of The Order of Culture, Japanese Government 1974, The American Physical Society International Prize for New Materials 1985, IEEE Medal of Honor 1991, and Japan Prize 1998.

#### Lecture 5 Aug. 27 13:15-14:45 Main Convention Hall

What did I explore in Half a Century of Research?

Four Seasons

(1) 1925—1947 "Childhood and Adolescence"

I was born in Osaka, and then lived in Kyoto until finishing a high school. I then moved to Tokyo, and graduated from the University of Tokyo in 1947. Coincidentally, 1947 is the year in which the epoch-making transistor was invented.

(2) 1947—1960 "Youth"

I started to work at Kobe Kogyo Corporation where I stayed until I joined Sony in 1956. There, I developed the Esaki Tunnel diode in 1957, which was to be my Ph.D thesis at the University of Tokyo, later for which I was awarded the Nobel Prize in Physics (1973).

(3) 1960—1992 "Life in New York"

I moved to the United States in 1960, joining IBM T. J. Watson Research Center, New York, where I pioneered "designed semiconductor quantum structures or man-made superlattices," opening up a new frontier in the field of semiconductors for which the Japan Prize was awarded (1998).

(4) 1992—Present "New Life in Tsukuba"

When I was voted President, University of Tsukuba, I returned to Japan in 1992.

Currently, I have been serving President, Yokohama College of Pharmacy since 2006, Chairman, the Science and Technology Foundation of Ibaraki since 1998, and also the Science Academy of Tsukuba, since its inception, 1999.

Camp 5-1 Aug. 28 13:15-14:30 Conference Room 201

Associate: Tetsuo Kodera, Tokyo Institute of Technology



## Makoto Kobayashi Nobel Laureate in Physics 2008

Makoto Kobayashi was educated at Nagoya University, and received his Ph.D. in theoretical physics in 1972. He and Toshihide Maskawa proposed the so-called Kobayashi-Maskawa model in 1973, when they were both in Kyoto University. He moved to

KEK in 1979, and was the Director of KEK's Institute of Particle and Nuclear Studies (2003-2006). The B-factory experiments at KEK and SLAC have proven that their model describes CP-symmetry breaking of elementary particles correctly. He has been awarded numbers of prizes, including the Nobel Prize in Physics 2008. He is Acting Chairman of Asian Science Camp Advisory Committee.

#### Lecture 4 Aug. 27 10:15-11:45 Main Convention Hall

#### Matter and Antimatter

It is known that every particle has its antiparticle. In our natural environment, however, there is no antimatter which is made of antiparticles. This puzzle is called the problem of matter dominance in the universe. The problem is closely related to CP violation in particle physics. CP violation is asymmetry of the fundamental laws of nature under the exchange of particles and antiparticles. In the standard model of elementary particles, CP violation is explained by flavor mixing among quarks. This was experimentally verified with the use of the B-factory accelerator.

Camp 2-3	Aug. 26 16:30-17:45	<b>Conference Room 406</b>
Camp 3-1	Aug. 27 15:00-16:15	<b>Conference Room 201</b>
Camp 4-1	Aug. 27 16:30-17:45	<b>Conference Room 201</b>



#### Motoko Kotani

## Director, Advanced Institute for Materials Research, Tohoku University

Motoko Kotani received her Ph.D. in mathematics from Tokyo Metropolitan University in 1990. She has been a professor at Tohoku University since 2004. She is also the Director of the brand-

new Advanced Institute for Materials Research (AIMR) at Tohoku University, funded under the World Premier International Research Center Initiative by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. She is a pioneer in the research on Discrete Geometric Analysis, one of the new frontiers in Geometry of mathematics. She is promoting the collaboration between mathematicians and materials scientists to develop new and innovative materials. She was awarded in 2005 the Saruhashi Prize, given yearly to a female scientist who serves as a role model for younger female scientists.

#### Lecture 3 Aug. 27 8:30-10:00 Main Convention Hall

Discrete Geometric Analysis and its applications to Materials Science.

Do you realize our cosmos is full of symmetry? Mathematics, Geometry in particular, has developed to understand why it is. The mathematical framework to describe the symmetry is called group. In the present lecture, we study the notion of group, and then by assuming the principle of least action, we see what makes the symmetry in nature. Symmetry does not exist only in what we see in our daily life (macroscopic phenomena), but also in what we cannot see without the aid of microscopes, e.g. in atom configurations of materials. Discrete Geometric Analysis concerns the symmetry of microscopic structures, say atomic structures of materials, and discovers the relation of the microscopic structures with their macroscopic properties. Few things, however, are known. A big challenge in materials science is to make bridges over the hierarchy of sizes.

Camp 1-3	Aug. 26	15:00-16:15	<b>Conference Room 406</b>
Camp 3-4	Aug. 27	15:00-16:15	<b>Conference Room 405</b>
Camp 4-4	Aug. 27	16:30-17:45	<b>Conference Room 405</b>

Associate: Satoshi Ishiwata, Yamagata University



## Yuan T. Lee Nobel Laureate in Chemistry 1986

Yuan T. Lee received his M.S. from Tsing Hua University in 1961 and his Doctorate from UC Berkeley in 1965. He went to Harvard as a post-doctoral fellow in 1967. He then took faculty appointments at the University of Chicago and UC Berkeley, and

became University Professor and Principal Investigator at the Lawrence Berkeley Laboratory, UC Berkeley, before taking over the position of the President of Academia Sinica (1994-2006). He shared the Nobel Prize in Chemistry 1986 with Prof. Dudley Herschbach and Prof. John C. Polanyi for their work in the field of reaction dynamics. He is a Co-Funder of Asian Science Camp.

#### Lecture 7 Aug. 28 10:15-11:45 Main Convention Hall

#### My Life as a Chemist

Scientists are usually perceived as hard working bunch. They work long hours often through days and nights, and in order to become successful, they will have to sacrifice vacations and other enjoyment of life. In addition, for the efforts they are making they seemed not to be very well rewarded. This picture is certainly not quite true.

Indeed scientists work extremely hard, they are driven by curiosity, and their dedication is often motivated by finding the truth and accomplishing something nobody had been able to do before. However, the most important thing is the fact that they are enjoying their life immensely for intensive engagement in their exciting scientific discoveries. It is also interesting to note that if we measure the wealth of a person not by the amount of money one put into his or her bank account, but by the amount of money one can spend on things he or she wants most, I believe scientists are among the wealthiest in the world, because in a modern society, the fund provided for scientific research is quite substantial.

For those young people who enjoy the challenge of solving problems, there is nothing as enjoyable and as rewarding as to become a scientist. It is certainly not true that all easy problems are solved by those who came before us. It is only when we solve the problem that the problem becomes an easy problem. The knowledge accumulated by mankind is by no means perfect, we are rather ignorant and there are many, many challenging problems which are awaiting young creative scientists to solve.

In this lecture a story of how a young man who grew up in Taiwan overcame the gap between ideals and reality along his path of school education and learning to be a scientist; how he has chosen to overcome the limitation set forth by traditional and conventional values and lead his own idealistic life, and finally made a giant step forward in the development of science, specifically in the field of the dynamics of chemical reaction.

In addition to the discussion of creativity and science education in general, basic knowledge related to molecular collision and chemical reaction will be introduced as well. Some suggestions will also be provided for the young generation in the hope of helping them find their own way to realize their ideal at a time when human society is at a crossroads.

Camp	3-3	Aug. 27	15:00-16:15	<b>Conference Room 406</b>
Camp	<b>4-3</b>	Aug. 27	16:30-17:45	<b>Conference Room 406</b>
Camp	5-3	Aug. 28	13:15-14:30	<b>Conference Room 406</b>

Associate: Mizuho Fushitani, Nagoya University



## **Hitoshi Murayama** Director, Kavli Institute for the Physics and Mathematics of the Universe, the University of Tokyo

Hitoshi Murayama received his Ph.D. in theoretical physics from University of Tokyo in 1991. He worked as a Research Associate at Tohoku University from April 1991, and was a postdoctoral

fellow at Lawrence Berkeley National Laboratory from September 1993. He joined the Physics Department at UC Berkeley in July 1995, became an Associate Professor in July 1998, and Professor in July 2000. Professor Murayama is also the Director of the brand new Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) at University of Tokyo, as of 2013. He received Yukawa Commemoration Prize in Theoretical Physics in 2002. He is a Fellow of American Physical Society and a Member of the American Academy of Arts and Sciences. He is well-known for his clear lectures for students and general audience.

Lecture2Aug. 2613:15-14:45Main Convention HallIntroduction to Cosmology

Where did we come from? Why are we here? Where are we going? These age-long questions are now subjects of modern science. I introduce basic concepts in this area

of rapid progress. We are literally stardust, born in old stars. Yet stars did not form without mysterious dark matter which dominates the matter content of the Universe. The fate of the Universe is governed by even more mysterious dark energy, that comprises about 70% of the Universe. And the study of the Universe, the biggest thing we can think of, is intimately connected to the study of the tiniest things, elementary particles.

Camp 1-2	Aug. 26	15:00-16:15	<b>Conference Room 202</b>
Camp 2-2	Aug. 26	16:30-17:45	<b>Conference Room 202</b>
Camp 3-2	Aug. 27	15:00-16:15	<b>Conference Room 202</b>

#### Associate: Ryuichiro Kitano, KEK



#### **Ei-ichi Negishi** Nobel Laureate in Chemistry 2010

Ei-ichi Negishi went to the US in 1960 after graduating from the University of Tokyo, and received his Ph.D. in chemistry from the University of Pennsylvania in 1963. He has been a researcher at Purdue University for more than thirty years; he is currently

Herbert C. Brown Distinguished Professor of Chemistry and Teijin Limited Director of the Negishi-Brown Institute. He is a pioneer in developing metal-based reactions called palladium-catalyzed cross-coupling, which allow for easy and efficient synthesis of complex organic compounds. He was awarded the Nobel Prize in Chemistry 2010, jointly with Richard F. Heck and Akira Suzuki, for palladium-catalyzed cross couplings in organic synthesis.

#### Lecture 1 Aug. 26 9:15-10:45 Main Convention Hall

Magical Power of d-Block Transition Metals—Pd-Catalyzed Cross-Coupling and Zr-Catalyzed Asymmetric Carboalumination of Alkenes (ZACA)

Until recently, the majority of the 24 d-block transition metals had been used as superior useful and sturdy materials. Half a century ago, a wide range of possibilities for use of d-block transition metals as catalysts for organic synthesis were recognized. These opportunities stem from mainly two fundamental properties of the d-block transition metals: (1) simultaneous presence or availability of one or more filled-

nonbonding (HOMO) and empty (LUMO) valence-shell orbitals, i.e. "carbene-like," often as highly reactive and yet thermally stable species, (2) ability to undergo ready and reversible Redox processes under one-set of reaction conditions.

These properties have led to the development of a large number and widely ranging processes including critically important C–C bond formation reactions proceeding through: (a) reduction elimination (ex. Pd-catalyzed cross-coupling), (b) carbometalation (ex. ZACA reaction), and (c) migration insertion (ex. carbonylation including "oxo" process).

In this lecture, a brief discussion of the Pd-catalyzed cross-coupling (mostly Negishi coupling) will be followed by a more detailed discussion of the **Z**r-catalyzed **a**symmetric **c**arboalumination of **a**lkenes (ZACA reaction).



#### Associate: Hiroyuki Asakura, Nagoya University



### Ada E. Yonath Nobel Laureate in Chemistry 2009

Ada Yonath, graduated the Hebrew University, earned Ph.D. from Weizmann Institute (WIS) and postdoced at Mellon Institute and MIT. In the seventies she established the first laboratory for protein crystallography in Israel, the only laboratory of this kind

in the country for almost a decade. Since the eighties she is WIS Kimmel Professor and the Director of Kimmelman Center for Biomolecular Structure and Assembly. In parallel, during 1986-2004 she headed the Max-Planck-Research-Unit for Ribosome Structure in Hamburg, Germany. She is a member of several academies, including US National Academy; Israel Academy of Sciences & Humanities; Korean Academy for Science & Technology; European Molecular Biology Organization (EMBO). She holds honorary doctorates from almost all Israeli Universities; KEK, Japan; Oslo U; NYU and Mount Sinai Universities; Hamburg University; Oxford and Cambridge Universities. Her awards include the Israel Prize; the Paul Karrer Gold Medal; Louisa Gross Horwitz Prize; Paul Ehrlich-Ludwig Medal; Linus Pauling Gold Medal; Anfinsen Prize; Wolf Prize; Massry Award; UNESCO/L'Oreal Award for Women in Science; Albert Einstein World Award for Excellence; Erice Peace Prize; Indian PM Gold medal; President of Panama Award; Maria Sklodowska-Curie Medal; Cite of Florence Prize; Datta Medal; The Nobel Prize for Chemistry.

#### Lecture 6 Aug. 28 8:30-10:00 Main Convention Hall

The Fruits of Curiosity

Striving to understand the molecular basis of the translation of the genetic code, a basic and most important process of life, we determined the structure of the ribosome, thus deciphering its mode of function of the universal cellular "factory" that performs the formation of the proteins (the cell workers) according to the genetic code.

We found that the peptide bonds are formed within a pocket composed only of ribosomal RNA and that this pocket is highly conserved in all known ribosomes, thus proposed to be a remnant of the prebiotic era (called by us the "proto ribosome"), which is still functioning in the contemporary world.

Owing to the vital role of ribosomes in cell life, they are targeted by many antibiotics, each of which paralyzes the ribosomes' activities by binding to their functional sites. Further studies revealed the antibiotics binding modes, inhibitory actions and synergism pathways of almost all ribosomal antibiotics. These indicated the principles of differentiation between patients and pathogens, suggested mechanisms leading to bacterial resistance and paved ways for improvement of existing antibiotics as well as for the design of advanced therapeutics capable of minimizing antibiotics resistance.

 Camp
 4-2
 Aug. 27
 16:30-17:45
 Conference Room 202

 Camp
 5-2
 Aug. 28
 13:15-14:30
 Conference Room 202

Associate: Fumiaki Yumoto, KEK

# **Activities and Tours**

## **Group Activity 1**

In the evening of Monday, August 26th, students will do a "warming-up" practice for Poster Preparation sessions. During the lunch and dinner hours, students should introduce themselves to the other team members and get to know each other. In the Group Activity 1, each team is requested to make a presentation, by drawing pictures on a white board, on some keywords from the Lectures and Camps on the first day. Instructors and Assistants will be with the students to work together and facilitate the activity.

## **Group Activity 2**

In the evening of Tuesday, August 27th, we invite you to experience Japanese culture such as Origami, a Japanese traditional folk art of paper folding, Shodo or calligraphy, and Yosakoi, a form of traditional dance from Kochi Prefecture in Shikoku (one of the main islands of Japan).

#### Tours

Four types of excursions by bus have been planned for Thursday, August 29th. Firstly, in the morning we will visit one of the research institutes and science facilities. Then we will travel a little further to Oedo Onsen Monogatari in Tokyo, where you have a lunch of Japanese food, can enjoy (wearing) a Japanese casual kimono, called Yukata, and Japanese traditional culture of the Edo period in 1603-1868. In the late afternoon, we will visit Asakusa, a major tourist area where the oldest temple in Tokyo, called Senso-ji, and one of the oldest shopping centers are located.

We hope you will enjoy a glimpse of Japan's history, culture, science and technology.

### **Course A**

High Energy Accelerator Research Organization (KEK)



http://legacy.kek.jp/intra-e/

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# **Course B**

Tsukuba Space Center (JAXA)



http://www.jaxa.jp/visit/tsukuba/index\_e.html

#### **Course C**

National Museum of Emerging Science and Innovation (Miraikan)



©NATIONAL MUSEUM OF EMERGING SCIENCE AND INNOVATION (Miraikan) http://www.miraikan.jst.go.jp/en/

#### **Course D**

Science Square Tsukuba (at AIST)



http://www.aist.go.jp/aist\_e/sst/

# **Common destination to all courses**

Oedo Onsen Monogatari



©Oedo Onsen Monogatari http://www.ooedoonsen.jp/higaeri/english/index.html

Asakusa



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# I Important Phone Numbers

#### Secretariat (Aug. 25-30)

Room 304, 3rd floor, Tsukuba International Congress Center "EPOCHAL TSUKUBA" TEL: 03-5434-8523 MOBILE: 080-5908-8523 FAX: 029-861-0606

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1-1 Oho, Tsukuba, Ibaraki 305-0801 Japan E-mail: asc2013@kek.jp

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