

**EU-Korea Conference  
on Science and Technology**

# **EKC2008**

**Computational  
Fluid  
Dynamics**

**CFD**

**Mechatronics  
and  
Mechanical  
Engineering**

**MME**

**ICT**

**Information  
and  
Communications  
Technology**

**LNS**

**Life and  
Natural Sciences**

28–31 August 2008, Marriott Hotel Heidelberg, Germany  
dedicated to the 35th anniversary of the foundation of VeKNI

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## Welcome addresses



Ladies and Gentlemen, dear Members, Presenters and Participants,

I am very pleased to welcome all of you to the EU-Korea Conference on Science and Technology, the EKC2008.

A very special welcome goes to Dr. Ki Joon Lee, President of KOFST, and Mr. Kwan-Bok Kim, Director General, Ministry of Education, Science and Technology.

I would like to thank all of you for accepting our invitation to attend the EKC2008, some of you in spite of very busy schedules.

Current research fields in science and technology will be presented and discussed at the EKC2008, which we hope will give a good insight into the interests and directions of researchers and technologists in the EU countries and Korea.

The Korean Scientists and Engineers Association in the FRG (VeKNI) has organized this conference jointly with the Korean Scientists and Engineers Association in the UK (KSEAUk), the Korean Scientists and Engineers Association in France (ASCoF), and the Korean Scientists and Engineers Association in Austria (KOSEA). This conference is dedicated to the 35th anniversary of the foundation of VeKNI.

Our association VeKNI was founded in the small town of Kronberg near Frankfurt in 1973. Already at that time, Korea had begun the industrialization of its economy, and new research and development institutes had been founded. At this time many Korean scientists and engineers living abroad were enticed to move back to Korea to work. In addition to this, Korea required a significant transfer of technology from industrial countries such as Germany. Both of these needs led to the foundation of our association in order to help promote the advancement of science and technology in Korea. One of goals of our association has been and is to provide a bridge between Korea and Germany in science and technology to a mutual benefit for both. As a service for the German industry we help German companies establish contacts and build-up trade networks in Korea. We help also both German and Korean companies in the recruitment of employees.

Today the VeKNI has about 800 members, who are working in industries, research institutes or universities or are studying in Germany.

The EU has been steadily increasing both in the number of its members and in its economic volume. The different economies of the EU countries are becoming more unified, and are achieving a close cooperation in science and technology. For instance, the EU Research Framework Programme - the world's largest funding programme for research projects - prompts research projects throughout the entire EU community. In the future, the EU will play an increasingly leading role in the world.

In the last decades Korea has experienced a rash development of its economy and the level of its science and technology. Korea's economic volume is currently positioned about 12th in the world, and it is a leading country in communication technology, home entertainment and shipbuilding. But despite these achievements, many EU citizens still think of Korea as a minor industrial country.

It will be beneficial for both Korea and the EU to get to know each other better, especially in fields of science and technology. The EKC2008 emerged from this idea, and the success of the conference has clearly shown the interest of both sides to strengthen the relationship between EU and Korean scientists and engineers.

I would like express my sincere thanks to the members of the international organizing committee, Jinil Kim, Yujin Choi and Man-Wook Han for their excellent co-operation in arranging this conference.

I would also like to thank the members of the local organizing committee for their patience and hard work.

I am also grateful to all of the sponsors, and especially our main sponsors Hyundai Motor, Kia Motor, KOFST, LG Electronics and Samsung Electronics.

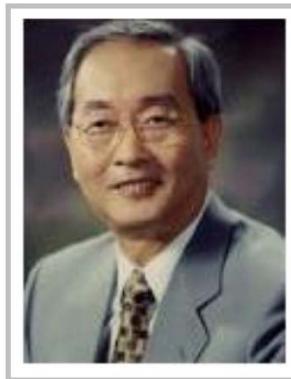
Finally, I thank all of the participants of the conference.

Seung-Deog Yoo  
VeKNI  
EKC2008 Co-chair

## Welcome addresses

Honorable President, Yoo Seung Deog, of Korean-German Scientists and Engineers Association President, Kim Jin Il, of Korean-British Scientist and Engineers Association President, Choi Yu Jin, of Korean-French Scientists and Engineers Association President, Han Man Wook, of Korean-Austrian Scientists and Engineers Association All ethnic Korean Scientists and Engineers, and Distinguished guests, Ladies and Gentlemen,

It is my great honor and pleasure to extend warm welcome to you to the first EU-Korea Conference on Science and Technology. As a representative of the Korean Federation of Science and Technology Societies, and as Co-Chair in the EKC-2008 Committee, I extend my gratitude to all the distinguished participants and guests who have come to share their views and knowledge of science and technology.



My fellow Korean Scientists and Engineers!

As is widely known, the EU is the world's biggest economic power, both with population of 487 million in 27 nations and the GDP worth of 13.5 trillion dollars. The EU and Korea have expanded their collaboration in many different ways in various fields.

In an OECD report, few countries have determined how best to adapt national policy frameworks to a more global innovation system. Under the circumstances, many share the same view that European countries will aggressively boost R&D spending by encouraging industry to increase their investment in R&D, and in particular, the multinational enterprises are expected to play a major role in driving the R&D performance.

The issues such as how appropriate national policies can keep up with the global innovation system and how they can have positive influence on the rest of the world have become important to policy makers.

However, the national policies are still being formulated without comprehensive understanding on the whole policy-making process in most countries. We also note that some European countries are interested in formulating and implementing comprehensive policies pertaining to the globalization of industrial R&D.

Korea now lags behind China, Singapore, and Thailand in terms of participation in the "EU Framework Programme", the international joint research program. We find this slow progress partly due to a lack of human network among Korean and European scientists and engineers; low recognition of the EU Framework Programme; and insufficient promotion campaign on capacity and competitiveness of Korean scientists and engineers, among others.

With the background, this conference will play a catalyst role in establishing professional networks and every one of you to play a critical role in collaboration between the EU and Korea.

Promoting the Korea-EU science and technology cooperation will lay the groundwork for further development in other fields, giving ways for Europe to the access to Asia and for Korea to the EU nations, as well.

Fellow Scientists and engineers!

The festival for Korean and European scientists and engineers is now officially opened.

The EU-Korea conference will foster cooperation between Korea and EU through a variety of activities such as exchange programs for scientists and researchers, among others. We can discuss on various topics by exchanging ideas and expert knowledge. The conference will serve an opportunity for scientists and engineers to predict changes in the days to come and provide solutions to the issues of global concern including energy, food, climate changes and so forth.

Finally, I would like to offer my gratitude to Presidents Yoo Seung Deog, Kim Jin Il, Choi Yu Jin, Han Man Wook and all the members and staffs of Korean-European Scientists and Engineers Association, for their endeavors in organizing such a marvelous event.

I do hope that all the distinguished participants and guests will enjoy their time in the conference.

Thank you very much.

Ki-Jun Lee  
President of Korean Federation of Science and Technology Societies  
EKC2008 Co-chair

## **EKC2008 Committees**

### **Conference Co-Chairs**

President Seung-Deog Yoo (VeKNI)  
President Ki-Jun Lee (KOFST)

### **International Organizing Committee**

President Seung-Deog Yoo (VeKNI)  
President Jin Il Kim (KSEAUK)  
President Yujin Choi (ASCoF)  
President Man-Wook Han (KOSEA)

### **Advisory Committee**

Prof. Dr. Zang Hee Cho  
Dr.-Ing. Young-Su Hoang  
Dr.rer.nat. Mong-Jeun Jun  
Visit. Prof. Dr-Ing. Jae-Geung Kim  
Dr.-Ing. Yohng-Sang Kim  
Dipl.-Ing. Kun-Chi Lee  
Dr.-Ing. Joon-Weon Seok

### **Program Committee**

Dr. Doo-Bong Chang (AR&T, Applied Robot & Technologies)  
Prof. Jinho Choi (University of Wales Swansea)  
Prof. Yongmann Chung (University of Warwick)  
Prof. Ruediger Dillmann (University Karlsruhe)  
Dr. Man-Wook Han (Viennna University Technology)  
Prof. Nahmkeon Hur (Seogang University)  
Prof. Jung-Joong Lee (Seoul National University)  
Prof. Kyong-Tschong Rhee (TU Braunschweig)  
Prof. Bjung-Ro Kim (RWTH Aachen)  
Prof. Seong-Lyun Kim (Yonsei University)  
Prof. In So Kweon (KAIST)  
Prof. Tjoung-Won Park (University Hannover)  
Prof. Young-Hyang Park (Muséum National d'Histoire Naturelle)  
Prof. Jivka Ovtcharova (University Karlsruhe)  
Prof. Milovan Peric (CD-adapco)  
Prof. Eduard Son (Moscow Institute of Physics and Technology)

### **Local Organizing Committee**

Dr. Jeong-Wook Seo (University Hamburg), Co-chair  
Mr. Hyun Joon Lee (University Hamburg), Co-chair  
Ms. Ryu-Ryun Kim (University Hamburg)  
Mr. Han Kyu Lee (University Hamburg)  
Ms. Hannah K. Lee (University Hamburg)

## Awards

### **Best Paper Award**

*There will be a best paper award including a prize of 1000 Euro along with a certification. This will be awarded to the best full length paper submitted to the conference.*

### **Graduate Student Best Paper Award**

*To encourage PhD Students to participate in the conference, a Graduate Student Best Paper Award program has been established. Four 500 Euro awards and a certification will be granted to PhD Students submitting high quality manuscripts (full length paper). To apply for these awards, an applicant must provide documentation that she/he is currently enrolled as a PhD student.*

### **VeKNI Outstanding Contribution Award**

*This award has been initiated to express our appreciation and gratitude to individuals who have made significant contributions to the work and goals of VeKNI.*

### **VeKNI Scholarship Awards**

*Each year VeKNI awards scholarships during its annual meeting to its student members who have been very active in the VeKNI events during the past year. This year 5 scholarships will be awarded during this conference. Please contact your local chapter leader for the application form.*

## **VeKNI Outstanding Contribution Award**



**Dr. Kwon, Moon Sik**

This award has been initiated to express our appreciation and gratitude to individuals who have made significant contributions to the work and goals of VeKNI. Dr Kwon is the first recipient of this award.

Dr. Kwon was born in Seoul, Korea and received his Bachelor of Mechanical Engineering from Seoul National University. He continued his studies at RWTH Aachen in Germany, where he received his Dipl.-Ing. and Dr.-Ing. degrees. Dr. Kwon is currently president of Hyundai Steel Company.

Dr. Kwon joined the Hyundai Motor Group in Korea in 1991 and from 1999 up to the beginning of this year he led the automobile research as a vice president at Hyundai Motor. Under his lead important technologies were developed such as battery driven electric vehicles, hybrid automobiles and eco-friendly cars. In particular, a laboratory for environmental research (Hyundai Motor Vehicle Laboratory For Environment) was established as the world's first in the automobile industry.

In January 2008 Dr. Kwon moved from Hyundai Motor to Hyundai Steel Company. Here he has introduced highly advanced technologies for integrated iron & steel work under construction and works very closely with the ThyssenKrupp Steel Company in Germany.

Dr. Kwon has served as a council member of the VeKNI and was a vice president in the Korean Society of Mechanical Engineers (KSME) in 2006, and serves as chairman of Korean Society of Life Cycle Assessment since 2008. He received the award "Jangyoungsil" from the Minister of Science and Technology of Korea for his outstanding contribution to automobile technology in 2005.

## **SCIENTIFIC PROGRAM**

## Time Table

		August 28 2008			
		Friedrich Hegel	Karl Jaspers	Mark Twain	Hannah Arendt
10				International Organizing Committee Meeting	
11					
12					
13				Registration	
14				Young Generation Forum (YGF)	
15					
16					
17					
18					
19					
20		Welcome Reception		Presidents and Science Attaché Meeting	
21					

		August 29 2008								
		Friedrich Hegel	Karl Jaspers	Franz Kafka	Hannah Arendt					
8	00			Life and Natural Sciences Session 10: Environment	Ultra Program Meeting Workshop: Energy					
	20									
	40									
9	00									
	20									
10	40	Coffee Break (20 min.)								
	00	Opening Ceremony								
	20									
	40									
11	00					Plenary Session I Prof. Zang Hee Cho				
	20									
	40									
12	00					Lunch				
13	00	Plenary Session III Prof. Ruediger Dillmann								
	20									
	40									
14	00	Plenary Session IV Dr. Sang Rok Oh								
	20									
	30									
15	50	Life and Natural Sciences Session 11: Basic Science	Mechatronics and Mechanical Engineering Session 4: Energy I	Technopark & Cluster Information Forum	Ultra Program Meeting Workshop: Biotechnology					
	10									
	30		Break (10 min.)							
16	40	Life and Natural Sciences Session 12: Poster Presentation (Room: Ernst Bloch)	Mechatronics and Mechanical Engineering Session 4: Energy II	Information and Communication Technology Session 8	Technopark & Cluster Information Meeting (Room: Mark Twain)					
	00									
	20									
	40									
17	00	Coffee Break and Poster Session (20 min.)								
	20									
	40									
	00									
18	20		Energy and Environmental Technology Forum	Computational Fluid Dynamics (CFD) Session 1						
	40									
	00									
19	00	LG Conference Banquet								
	00									
20	00									
21	00									
22	00		Environmental Technology Forum : Networking Bar							

		August 30 2008					
		Friedrich Hegel	Karl Jaspers	Franz Kafka	Hannah Arendt		
8	00	Mechatronics and Mechanical Engineering Session 5: Mechanical Engineering I	Life and Natural Sciences Session 13: Life Science	Energy and Environmental Technology Workshop I			
	20						
	40						
9	00		Coffee Break (20 min.)				
	20						
10	40	Life and Natural Sciences Session 14: Life Science	Women in Science and Engineering Forum				
	00						
	20						
	40						
12	00	Lunch					
13	00	Plenary Session V Prof. Jivka Ovtcharova					
	20						
	40	Plenary Session VI Prof. Eduard Son					
14	00	Break (10 min.)					
	20	Plenary Session VII EVP Yongeok Shin					
15	30						
	50	Plenary Session VIII Dr. Kang In Rhee					
	50						
16	00	Mechatronics and Mechanical Engineering Session 6: Robotics II	Information and Communication Technology Session 9	Energy and Environmental Technology Workshop II			
	20						
	40						
	00						
17	20	Coffee Break and Poster Session (20 min.)					
	40	Mechatronics and Mechanical Engineering Session 7: Mechanical Engineering II	Computational Fluid Dynamics (CFD) Session 2	Women in Science and Engineering Workshop			
18	00						
	20						
	40						
19	00	Samsung Conference Banquet & Classical Music Evening (VeKNI)					
20	00						
21	00						
22	00	Women in Science and Engineering Forum : Networking Bar					

		August 31 2008			
		Friedrich Hegel	Karl Jaspers	Franz Kafka	Hannah Arendt
9	00		Sightseeing Heidelberg Funded by VeKNI		
	00				
	00				
10	00		Lunch Packet Funded by VeKNI		
	00				
11	00				
	00				
12	00				
	00				
13	00				

## **Plenary Sessions**

**Session I (29<sup>th</sup> of August, Friedrich Hegel):** Prof. Zang Hee Cho

10:40 21st Century Brain Sciences; Zang Hee Cho (Gachon University, Korea; University of California, Irvine, USA)

**Session II (29<sup>th</sup> of August, Friedrich Hegel):** Prof. Norbert Peters

11:20 Spray Formation and Combustion in Diesel Engines: Fundamental Aspects; Norbert Peters (RWTH, Germany)

**Session III (29<sup>th</sup> of August, Friedrich Hegel):** Prof. Ruediger Dillmann

13:00 Towards Emerging Cognitive Capabilities of Humanoid Robots; Ruediger Dillmann (University of Karlsruhe, Germany)

**Session IV (29<sup>th</sup> of August, Friedrich Hegel):** Dr. Sang-Rok Oh

13:40 Fusion of ICT and RT for Quality of Life; Sang-Rok Oh (KIST, Korea)

**Session V (30<sup>th</sup> of August, Friedrich Hegel):** Prof. Dr. Dr.-Ing. Jivka Ovtcharova

13:00 Virtual Engineering -Paradigm shift in research, education and industrial collaboration; Jivka Cvcharova (University of Karlsruhe, Germany)

**Session VI (30<sup>th</sup> of August, Friedrich Hegel):** Prof. Eduard Son

13:40 Plasma and Thermal Actuators for Flow Control; Son E.E., Son K.E. (Moscow Institute of Physics and Technology, Russia)

**Session VII (30<sup>th</sup> of August, Friedrich Hegel):** Executive Vice-President Yongeok Shin

14:30 Mobile Handset Market & Technology Trend; Yongeok Shin (LG Electronics Europe R&D Center, France)

**Session VIII (30<sup>th</sup> of August, Friedrich Hegel):** Dr. Kang In Rhee

15:10 Recycling R&D Program in RRDC; Kang In Rhee (RRDC, Korea)

## **Plenary Session I: Prof. Zang Hee Cho**



### **21st Century Brain Sciences**

Z.H. Cho

Neuroscience Research Institute,  
Gachon University of Medicine and Science,  
Incheon, Korea  
&

Department of Psychiatry and Human Behavior &  
Radiological Sciences, University of California, Irvine, CA, USA

Our modern science began to allow us to look and investigate our human brain without invasive procedures such as cutting and dissecting, thanks to the modern Sciences and Technology. With help of Positron Emission Tomographic (PET) scanner, scientists began to study molecular and chemical changes in the brain that are taking place while one is in conversation with another persons, totally in noninvasive manner. Another modern scientific tool that is essential for the study of human brain is the well known magnetic resonance imaging or simply known as MRI. MRI is a brain imaging tool with which one can study many details of our brain without invasive procedures and is able to show such as where they are and how they are functioning, in live human. Both PET and MRI are now developed to a highly sophisticated level requiring great deal of expertise and expenses. They are, therefore, not readily available for ordinary scientists and investigators. These tools now provide most essential information on our survivals, such as early detection of cancerous tumors or early diagnosis of deadly neurodegenerative diseases such as Strokes, Parkinson's, and Alzheimers, not to mention numerous cognitive impairments and mental diseases our human confronted in this modern time.

I will deliver a talk on new developments in modern brain imaging and tools that are in the frontier the field of such as PET-MRI fusion system we have developed and its performances.

*Prof. Cho received his Ph.D. at Uppsala University (Sweden) in 1966. He is a director at Neuroscience Research Institute, Gachon University of Medicine and Science, Korea. He has been in neuroscience since the inception of the computerized tomography (CT) in 1972. Professor Cho was one who pioneered mathematical algorithms related to CT scanners and developed one of the first 3-D image reconstruction algorithms. Dr. Cho's subsequent work based on 3-D image reconstruction was the first "Ring PET" and its nuclear detector "Bismuth Germanate Oxide (BGO)", both of which revolutionized modern brain-imaging. Dr. Cho was elected to the US National Academy of Sciences-Institute of Medicin in 1997 for his contribution to the PET development. Prof. Cho is a member of the VeKNI Advisory Committee.*

## **Plenary Session II: Prof. Norbert Peters**



### **Spray Formation and Combustion in Diesel Engines: Fundamental Aspects**

Norbert Peters

Institut für Technische Verbrennung, RWTH Aachen, Germany  
[n.peters@itv.rwth-aachen.de](mailto:n.peters@itv.rwth-aachen.de)

The understanding of combustion and pollutant formation in Diesel engines requires a profound knowledge of the processes that occur prior to auto-ignition. This is the sequence spray formation, evaporation and turbulent gas phase mixing. Weaknesses in the understanding and modelling of these processes will severely affect the prediction of combustion and engine performance as a whole. The purpose of this keynote lecture is two-fold: Firstly to point at some of these weaknesses and other uncertainties, secondly to demonstrate the present state of spray measurements, direct numerical simulations of primary atomisation and CFD predictions and measures to improve the latter.

*Prof. Peters was educated at the Karlsruhe University of Technology and later at the Technical University of Berlin. He is a director at the Institute for Technical Combustion. Research interest of Dr. Peters is in laminar and turbulent flames. The interaction between turbulence and combustion constitutes an important part of his research. Prof. Peters is well-known for his ideas on flamelet model in turbulent combustion as well as for the systematic generation of reduced reaction mechanisms from detailed reaction mechanisms. Prof. Peters is author or coauthor of about 300 scientific publications and several books.*

## **Plenary Session III: Prof. Ruediger Dillmann**



### **Towards Emerging Cognitive Capabilities of Humanoid Robots**

Rüdiger Dillmann  
Universität Karlsruhe (TH)

Humanoid robot systems are designed to interact with humans in terms of observation and understanding of human activities as well as conversation about the task to be done and how to do the task and finally how to execute it. In addition humanoids have to act goal-oriented but have also to be capable to react on disturbances or unexpected events e.g. a context change in a competent manner. Such robot systems operate in dynamic human centered scenarios which require capabilities such as adaptivity, perception, categorisation, action and learning. Examples for such systems are service robots and humanoids that interact in a human centered environment in a context dependand goal-oriented manner and which cooperate with humans. The behaviour of such a robot is characterized by active sensing processes, fusion of multimodal sensor data, perception, categorisation, interpretation and decision making of how to select appropriate actions and to initiate them in a superimposed control systems. Thereby learning and shaping of sensory and motoric abilities as well as the active observation and interpretation of situations and actions are of major interest. A probate approach for learning knowledge about actions and sensomotoric abilities is to acquire knowledge with the help of sensorial observation of humans, trying to imitate, to understand and to transfer these abilities into the memory of the robot. This requires a kind of motion capture, observation of interaction, tracking of object state transitions and observation of spatial and physical relations between objects. By doing this, it is possible to acquire so-called "skills", situative knowledge as well as task knowledge, and can be introduced to new and unknown tasks. New terms, new objects and situations, even new types of motion can be learned with the help of a human tutor and in addition existing knowledge may be corrected interactively via multimodal communication channels. The term multimodality describes communication channels which are intuitive for humans, such as language, gesture and haptics including physical human-robot contact. These channels are to be used for commanding and instructing the robot system. The field of programming by demonstration has been evolved strongly as a response to the needs of generating flexible programs for humanoid robots and is largely driven by attempts of modeling human behaviour and it's mapping onto humanoid robots. It comprises a broad set of observation techniques processing large sets of data from high speed camera systems, laser, data-gloves and even exoskeleton devices. Some systems operate with precise a-priori models other use statistical approaches to approximate human behaviour from observations. Observation is done to identify objects, motion and action in space and time, interaction with the environment and ist effects. From this observation usefull regularities, time histories, relational and situative structures and it's interpretation in a given context can be derived. Some efficient systems have been developed which combine active sensing, computational learning techniques supported by multimodal dialogues. They are capable to enrich and expand the semantic system level, use episode memorisation techniques and are capable to map situation dependend strategies making use of the learned knowledge to adapt the robot controls to emerging situations. One important paradigm is that objects and action representations cannot be separated and form the building blocks for cognitive robot system behaviour. Thus, so called object-action complexes -OACS- can be derived to unify different sensor, actuator and object representations including language and allow the robot to understand its environment. A "Humanoid Robot" consisting of a mobile platform and a flexible torso equipped with a two-arm system with five-finger hands, a head with visual and acoustic sensors is being implemented to behave like a human. The human-robot cooperation requires the detection of human aims and intentions to identify the actual context referencing already memorized corporately accomplished actions and to apply this knowledge to the individual

situation in the correct way. The status of the Humanoid Robot Project (SFB-588 „Humanoid Robots“) is outlined and the achieved results are discussed.

*Prof. Dr.-Ing. Rüdiger Dillmann received a Ph. D. at th Karlsruhe University of Technology in 1980. Since 1987 he is as Professor of the Department of Computer Science leader of several research groups. Prof. Dillmann's research areas are computer science in medicine, robotics with special interest in intelligent, autonomous and mobile robotics, machine learning, machine vision and simulation techniques. Prof. Dillmann is author or coauthor of more than 150 scientific publications and several books. He has been organizer and chairman to various conferences*

#### **Plenary Session IV: Prof. Sang-Rok Oh**



#### **Fusion of ICT and RT for Quality of Life**

Dr. Sang-Rok Oh,  
KIST, Korea  
sroh@kist.re.kr

In the seminar, a prospective of fusion of ICT (information & communication technology) and RT (robot technology) will be introduced. As a motivation, change towards ubiquitous society and mega trend for digital convergence will be mentioned with simple examples of market-available products. Based on the motivation, Korean National Project entitled as URC (Ubiquitous Robotic Companion) will be also introduced with research results so far. Finally, future plan including on-going projects based on global collaboration will be also mentioned.

*Dr. Oh joined the Korea Institute of Science and Technology (KIST) in 1988 after graduation from Korea Advanced Institute of Science and Technology(KAIST) for his Ph.D. degree, and has been working as a Principal Research Engineer at the Center for Cognitive Robotics Research, KIST. During 2000-2003, he was a Head of Intelligent System Control and Robotics Center, KIST. In 1999, he also became a Director of Bio-mimetic Control National Research Laboratory, which was designated by Ministry of Science and Technology, Korea. He was a Visiting Scientist at the T. J. Watson Research Center, IBM, Yorktown Heights, NY, from 1991 to 1992, conducting precision assembly using the magnetically levitated robot twist. He also worked as a Visiting Scientist at the Mechanical Engineering Laboratory, Tsukuba, Japan, for three months in 1995, investigating the area of mobile manipulation system. From September 2003 to February 2008, he has been working as a Project Manager of Intelligent Service Robots and u-Computing area at Ministry of Information and Communication, Republic of Korea where his main duties include R&D planning, managing, evaluation, commercialization and policy advising in the fields, and from December 2006 to February 2008, he also worked as IT Policy Advisor to Minister at the same Ministry where he managed R&D programs for whole ICT area while giving policy advisor to Minister in terms of activities of industries, technical mega-trend, revitalization of small and medium size industries and future R&D plan. From March 2008, he joined again KIST. His research interests include information and communication technology, bio-robotics for quality of life, and network based intelligent service robots.*

## **Plenary Session V: Prof. Jivka Ovtcharova**



### **Virtual Engineering -Paradigm shift in research, education and industrial collaboration**

Prof. Dr. Dr.-Ing. Jivka Ovtcharova

Institute for Information Management in Engineering (IMI)

Karlsruhe University (TH)

Adenauerring 20, AVG 50.41

D-76131 Karlsruhe

Professor Ovtcharova's talk refers to her interdisciplinary research work in the adjacent fields of engineering technology and computer science. In particular, it covers the area of *Product Lifecycle Engineering* with focus on a holistic perception of the product life cycle using advanced methods of *Virtual Engineering* and *Process and IT Systems Integrationsolutions*. The application of immersive and interactive visualisation technologies is an integral part of *Product Lifecycle Engineering*, those technologies that allow perceiving a virtual reality with all senses. In future, the virtual prototype for the integrated simulation and interactive visualisation of a product's entire functionality, i.e. of a whole vehicle, will be the basic prerequisite of the next generation of engineering technologies, as well as of the strategic reorientation with respect to research and education. Jivka Ovtcharova has recently opened the *Lifecycle Engineering Solutions Center (LESC)* at KIT. LESC's concept is unique in Germany; it provides a central research facility for the interdisciplinary collaboration between internal and external research establishments as well as a platform for the continuous knowledge and technology exchange with the industry. Moreover, LESC provides flexible and scalable development environments within the fields of *Product Lifecycle Management* and *Virtual Engineering* - from single working environments to fully immersive large projection for future engineering solutions.

*Professor Ovtcharova's scientific career documents the extraordinarily strong interdisciplinarity of her research. She began her vocation in the field of Mechanical Engineering at the Technical University of Sofia in Bulgaria and in Heat-Power Process Automation at the Moscow Power Institute in Russia to continue to the field of Computer Science at the Fraunhofer Institute for Computer Graphics in Germany. During her academic career she primarily focused on mathematical modelling, CAD models, system architectures, feature based design, and virtual product creation while working several years at the Bulgarian Academy of Sciences and at the Fraunhofer Institute for Computer Graphics as well as during her research visits in Portugal, Italy, and the United States of America. Furthermore, Professor Ovtcharova enjoyed many years of successful industrial practice at General Motors in Europe, USA, and Brazil. Within the scope of her work she was responsible for the Global Process and System Integration Center Europe as well as the Vehicle Integration Performance and Quality Management at the International Technical Development Center of Adam Opel AG, with an emphasis on Product Lifecycle Management and Virtual Prototyping.*

*Jivka Ovtcharova's first doctor degree is in Mechanical Engineering from the Technical University, Sofia, Bulgaria; the second doctor degree is in Computer Science from the Technical University, Darmstadt, Germany.*

**Plenary Session VI: Prof. Eduard Son**



**Plasma and Thermal Actuators for Flow Control**

Prof. Eduard Son

*Moscow Institute of Physics and Technology, Dolgoprudny,  
Moscow Region, 141700, Russia*

In spite of vast research of plasma actuators (PA) for flow control still no theoretical background based on oriented experiments and adequate software for predicting and optimization of NACA profiles and vehicles. In the primary analysis it is shown that for different types of actuators -mechanical, acoustical, thermal and plasma there are many common features, which follows from basics of aerodynamics. Each type of actuator creates pressure and shear driven force to controlled flow. Thus for choosing actuator type it necessary to solve inverse problem, i.e. for desired drug reduction of lift gain by CFD simulation find out optimal position external vorticity and pressure sources. Then it is necessary to choose actuator and design appropriate actuator and optimize its parameters. The problem of creating and optimization of plasma actuators is defined by task complexity consisting of two parts - aerodynamic and plasma. In the paper it made the analysis plasma actuators from points of view aerodynamics and plasma. The PA problem is highly multi-scale interdisciplinary (plasma and aerodynamic), where CFD analysis must be supplied with hydrodynamic and plasma models. The solution of complex CFD and Boltzmann equation for plasma kinetic and plasma chemistry could serve as reference for creating engineering methods the problem optimization. We propose to develop CFD for 3D numerical and experimental investigations of the pulsed near surface discharges in supersonic and subsonic flows with existing Eiffel wind tunnel and near surface DBD. Direct comparison with the results of the 3D numerical simulation of the discharge will be performed and fine structure of the discharge will be reconstructed. Detailed analysis of the gas acceleration, heating and expansion will be provided. Experimental measurements of the velocity profile will allow to perform a 3D analysis of the laminar and turbulent gas flow influenced by actuator will be analyzed. 3D vortexes formation and developing turbulence cascade processes will be studied. Two different processes of jet and vortex creating and their possibility to change separation region will be investigated. The results of research will be used for preparing the book on thermal and plasma flow control.

**EDUARD SON**, Scientist in Electrophysics, Thermodynamics, Plasma physics, Hydrodynamics and Turbulence, Informatics. BS, MS, PhD (MIPT), DrScience, Full Professor, Head of the Physical Mechanics Department MIPT, Distinguished Scientist of Russia, Fulbright Professor at MIT (Boston MA), Professor of British Council (UK), Member of Russian Academy of Sciences (2008)

## **Plenary Session VII: EVP Yongeok Shin**



### **Mobile Handset Market & Technology Trend**

Yong-Eok SHIN  
Executive Vice President  
LG Electronics Mobile Company Europe R&D Center, Paris, France  
[yongshin@lge.com](mailto:yongshin@lge.com)

The purpose of this material is to introduce LG's view about mobile market trends by networks and Technology trends by products, services and major components in next couple of years. LG also would like to share about business strategy briefly and success stories in this market.

*Executive Vice president Yong Eok SHIN is a man of extraordinary strength and vision. Excelling in everything he lays his hands on, he has led many innovation efforts on both national and international scales over 20 years of experience in telecommunications industry. Putting emphasis on developing new products that will lead to brand-new business opportunities, he was at the forefront of creating new landmarks in each technological era with cutting-edge developments. His corporate philosophy holds that success of business lies in fully grasping the trends, be it those of the market, technology or the competitor, in order to be ahead of others. He has put his belief into action when he pioneered the development and commercialization of Digital Public Switching System and Analogue Cordless Phone & DECT in the Korean market. Not stopping there, he also led Korea's first efforts in the very first development and commercialization of analogue mobile phones for Europe in both GSM and WCDMA. Given such rigorous drive for being the top, he is surprisingly humble and friendly towards his employees. He is often seen personally greeting field engineers almost on a daily basis.*

*Indeed, it is not surprising that his ideal form of leadership is an iron hand in velvet glove – holding rigorous strength behind supple and friendly attitude. Advocate of efficacy, what he the most is waste – of resources, time, efforts... even though.*

*Born in Seoul in 1953, he has majored in Computer Science at Seoul National University. He is married with 1 son and 1 daughter. In his spare time, he enjoys mountain climbing and music. Having played in a rock band at the university, he is also an advanced drummer.*

## **Plenary Session VIII: Dr. Kang-In Rhee**



### **Recycling R&D Program in RRDC**

Kang-In Rhee  
Resource recycling R&D center

In order to achieve resource and environment conservation, the resource recycling R&D center (RRDC) has been developing emerging technologies to lead a closed loop resources based on sustainable development under the support of the Ministry of Education, Science and Technology the Ministry of Environment since July 2000. The program at the center consists of 3 phases, namely, fundamentals, demonstration and commercialization of recycling processes. This presentation shows current status and results of excellent works such as effective separation and pyrolysis of mixed plastics, metal recovery from electronic waste, reutilization of inorganic waste. By continuing to develop technologies overcoming some barriers, to transfer them to related industries and enhance the recycling rate, the center will hope to promote the domestic recycling industry and further build an environmentally benign society.

#### **EDUCATION**

Resource Recycling R&D Center

Ph. D., Metallurgy, University of Utah, Salt Lake City, Utah, U.S.A., 1988

Thesis: Selective Chlorination of Iron from Low Grade Titanium Ore in a Fluidized Bed Reactor  
M.S., Metallurgy, Seoul National University, Seoul, KOREA, 1977

Thesis: Carbothermal Reduction of Nickel Oxide

B.S., Metallurgy, Seoul National University, 1975

#### **PROFESSIONAL EXPERIENCE**

Director, Industrial Waste Recycling R&D Center, 2000 to present

Director, Korea Institute of Geology Mining and Materials, 1999-2000

Group Leader, Korea Institute of Geology Mining and Materials, 1988-1999

Research Assistant, Univ. of Utah, Dep't of Metallurgical Engineering, 1981-1985

Instructor, Korea Naval Academy, Chemistry department, 1978-1981

#### **RESEARCH ACTIVITIES**

Resource Recycling R&D Center

Developing a special melting technique for refractory metals such as tungsten, molybdenum, niobium, tantalum

Developing functional materials using metallurgical process

Developing a recycling technology of valuable materials from various waste

#### **PROFESSIONAL SOCIETY ACTIVITY**

Committee of Presidential advisory Council on Science & Technology

Member of the National Academy of Engineering of Korea

Member of the Metallurgical Society

Member of Korea Institute of Metals and Materials

Member of the Korean Institute of Resource Recycling

Member of the Korean Society for Geosystem Engineering

Member of Korea Society of Waste Management

Member of the Korean Society for Life Cycle Assessment

#### **HONORS and AWARDS**

Order of Civil Merit, Mogryeon Medal, 2003

KIGAM Academic Awards, Silver, 1999

Shin-Hankookin Awards, 1995

## **Symposia**

**Computational Fluid Dynamics (CFD)**

- \* Industrial Flow Simulations (Aerodynamics, Ship Hydrodynamics, Automotive Engineering)
- \* Grid Generation and Adaptivity
- \* Multiphase Flows and Free Boundary Flows
- \* High Speed Flows and Flows with Heat Transfer
- \* Parallel Computing in CFD
- \* Combustion and Reactive Flows
- \* Physiological Flows
- \* Fluid-structure Interaction

**Mechatronics and Mechanical Engineering (MME)**

- \* Robotics and Automation
- \* Manufacturing Technology
- \* Mechanics of Solids and Structures
- \* Aerospace Engineering, Naval Architecture, and Automotive Engineering
- \* Micro and Nano Systems
- \* Medical and Biomedical Engineering
- \* Safety Engineering, Risk Analysis, and Reliability Methods

**Information and Communications Technology (ICT)**

- \* Internet Technologies and Services
- \* Next Generation Networking Technologies and Network Security
- \* Wireless Communications, Networks, and Services
- \* Multimedia Systems and Applications
- \* Education and Applications of Information and Communication Technologies
- \* Software Engineering and Embedded Systems
- \* Information Management in Engineering

**Life and Natural Sciences (LNS)**

- \* Clinical and Translational Medicine
- \* Life Science and Bioscience
- \* Organic and Inorganic Chemistry
- \* Theoretical, Applied and Experimental Physics
- \* Theoretical and Applied Mathematics
- \* Applied Nanotechnology in Natural Science
- \* Climate and Ecosystem

## **Computational Fluid Dynamics (CFD) Symposium**

Co-chairs:

Prof. Milovan Peric (CD-adapco Developer)

Prof. Eduard Son (Moscow Institute Physic and Technology)



**Prof. Milovan Peric**  
CD-adapcoDeveloper

Fluid flows and related phenomena (heat and mass transfer, phase change, chemical reactions etc.) play an important role in almost all fields of engineering as well as in environment and medicine. Two decades ago only large research institutions in industrial countries could afford powerful enough computers to conduct simulations of complex flows. Nowadays, thanks to the spectacular development of computers and information technology in general, CFD has become affordable to everyone.

The development of computer technology has been accompanied by the development of necessary software at a similar pace. Generation of a computational grid used to be a major obstacle to the use of CFD in practice, consuming weeks of engineer's time for even moderately complicated geometries; nowadays, the process from a CAD-model to

a CFD-mesh has become almost fully automatic. Advanced solution techniques like multigrid methods and parallel computing have lead to an increased efficiency of CFD software. Powerful visualization tools, including virtual reality, have made the analysis of complex flows easier.

CFD has now become an integral part of CAE (Computer-Aided Engineering). It is spreading out of research departments into design and production departments of large companies. The successful use of CFD requires spreading of know-how among engineers. It is important that the awareness of potential which CFD offers for optimization of engineering devices, reduction of power consumption or emission of pollutants, is spread among engineers and engineering managers. In addition to university courses on CFD, which have now become the rule rather than exception in most engineering universities, events like this Symposium are one way of communicating advances in CFD and its application.

Korean and European industries are both competing and complementing each other. Most people think immediately of shipbuilding and automotive industry, and in this context of hydro- and aerodynamics. However, CFD is used more to optimize underhood heat management, combustion in engine and comfort of passengers than to reduce aerodynamic drag of a car. Safety, comfort and environment protection have long become as important as energy efficiency and performance. International collaboration is essential for progress in all these fields. It is especially important that students and young engineers learn about the advantages which simulation technology offers and the latest advances in the field.

This Symposium on Computational Fluid Dynamics offers the opportunity for Korean and European scientists to report on latest advances in both development of methodology (grid generation, discretization, modeling, solution, visualization etc.) and its application to solving complex engineering problems. Getting to know each other and establishing contacts for future collaboration is equally important, and the accompanying events are supportive in this direction. Heidelberg is an inspiring location and we look forward to a successful Symposium!



**Prof. Eduard Son**  
Moscow Institute of Physics  
and Technology

**This symposium contains 2 sessions:**

**Session 1: Computational Fluid Dynamics 1**  
**17:20 – 19:00 August 29<sup>th</sup>, 2008**

**Session 2: Computational Fluid Dynamics 2**  
**17:40 – 19:00 August 30<sup>th</sup>, 2008**

## **Computational Fluid Dynamics (CFD)**

### **Session 1 (17:20 – 19:00 29th, Franz Kafka) Chair: Prof. Milovan Peric**

- 17:20 State-of-the-Art CFD Simulation to Assess Ship Safety; Bettar el Moctar (Germanischer Lloyd AG, Germany)  
17:40 Modelling the Aerodynamics of Coaxial Helicopters – from an Isolated Rotor to a Complete Aircraft?; Hyo Won Kim (Imperial College London, UK), Richard E Brown (University of Glasgow, UK)  
18:00 Implicit Algorithm for the Method of Fluid Particle Dynamics in Fluid-Solid Interaction; Yong Kweon Suh, Sangmo Kang (Dong-A University, Korea)  
18:20 A Numerical Study on Rotating Stall Inception in an Axial Compressor; Jae Hyun Baek (POSTECH, Korea), M. Choi (Imperial College, UK)

### **Session 2 (17:40 – 19:00 30<sup>th</sup>, Franz Kafka) Chair: Prof. Eduard Son**

- 17:20 Investigation of the Effect of Surface Roughness on the Pulsating Flow in Combustion Chambers with LES; Balazs Pritz, Franco Magagnato, Martin Gabi (University of Karlsruhe, Germany)  
17:40 Analysis and Test on the Flow Characteristics and Noise of Axial Flow Fans; Young-Woo Son<sup>1</sup>, Jangho Lee<sup>1</sup>, Seong-ryong Park<sup>2</sup>, Minsung Kim<sup>2</sup>, Jae Won Kim<sup>3</sup> (1. Kunsan National University, Korea; 2. Korea Institute of Energy Research, Korea; 3. Sun Moon University, Korea)  
18:00 A Numerical Study on Flow and Heat Transfer Analysis of Various Heat Exchangers; Myungsung Lee, Chan-Shik Won and Nahmkeon Hur (Sogang University, Korea)  
18:20 Application of a Level-Set Method in Gas-Liquid Interfacial Flows; Sang Hyuk Lee, Gihun Son and Nahmkeon Hur (Sogang University, Korea)

## **Mechatronics and Mechanical Engineering Symposium**

Co-chairs:

Prof. Ruediger Dillmann (University Karlsruhe)  
Dr. Man-Wook Han (Viennna University Technology)



The Symposium "Mechatronics and Mechanical Engineering" will cover the newest trends and development in this field. In this symposium two plenary lectures, 16 technical presentations and one panel discussion are planned. This workshop will bring together specialists from various fields, e.g. Robotics and Automation, Manufacturing Technology, Mechanics of Solids and Structures, Aerospace Engineering, Naval Architecture, and Automotive Engineering, Micro and Nano Systems, Medical and Biomedical Engineering, Safety Engineering, Risk Analysis, and Reliability Methods.

One main emphasis of the symposium is the robotics and its applications. Germany and Korea are two of leading countries in the field of Mechanical Engineering, Mechatronics and Robotics. From this reason we invited the distinguished experts from Germany and Korea to learn the robotic research approaches of both countries. From European viewpoint Prof. Rüdiger Dillmann from University of Karlsruhe will give a talk "Towards Emerging Cognitive Capabilities of Humanoid Robots". Dr. Sang Rok Oh from KIST, Korea will speak about the Fusion of ICT and RT for Quality of Life. For example, European researchers concentrated in the development of cognitive science and the use of this to the robot. Korean colleagues try to apply robots in the real environment for example, the use of robot caring elderly and disabled people. Also the Korea robot industry is participating. Dr. Kyung Chul Shin, Yujin Robotics, will talk about network based service robot for education. His company is already producing such robots. A general overview about the European intelligent robot research trends will be reported. In form of a panel discussion experts will discuss about the promotion of the research cooperation between Korea and EU. In parallel a robot demonstration is organized.



**This symposium contains 5 sessions;**

**Session 3: Robotics I**  
**08:00 – 09:40 August 29<sup>th</sup>, 2008**

**Session 4:**  
**Energy I**  
**14:30 – 15:30 August 29<sup>th</sup>, 2008**  
**Energy II**  
**15:40 – 17:00 August 29<sup>th</sup>, 2008**

**Session 5: Mechanical Engineering I**  
**08:20 – 09:40 August 30<sup>th</sup>, 2008**

**Session 6: Robotics II**  
**16:00 – 17:20 August 30<sup>th</sup>, 2008**

**Session 7: Mechanical Engineering II**  
**17:40 – 19:00 August 30<sup>th</sup>, 2008**

## **Mechatronics and Mechanical Engineering (MME)**

### **Session 3: Robotics I (08:00 – 09:40 29<sup>th</sup>, Karl Jaspers) Chair: Prof. Sang-Rok Oh**

- 08:00 A new 3-axis Force/Moment Sensor for an ankle of a Humanoid robot; In-Young Cho (Changwon National University), Man-Wook Han (Vienna University of Technology, Austria)  
08:20 Net work Based Service Robot for Education; Kyung-Chul Shin (Yujin Robot Co., Ltd, Korea)  
08:40 Summary of German intelligent Robot research Landscape 2007; Doo-Bong Chang (CEO Applied Robot & Technologies, Germany)  
09:00 Powered by Fuel Cells or MicroEngine; Jung-Sik Kim (Imperial College, UK)  
09:20 Research tendency on intelligent robotics in France; Woo Suck HAN (École Nationale Supérieure des Mines de Saint-Etienne, France)

### **Session 4: Energy I (14:30 - 15:30 29<sup>th</sup>, Karl Jaspers) Chair: Dr. Doo-Bong Chang**

- 14:30 Modelling of a bubble absorber for an ammonia-salt absorption refrigerator; Dong-Seon Kim (Arsenal research, Austria)  
14:50 Energy feedback measures impacting on the reduction of building energy consumption; Jong-Yeob Kim (University of Strathclyde, UK)  
15:10 Peak Oil and Fusion Energy Development; C. S. Kim (ITER, France)

### **Session 4: Energy II (15:40 - 17:00 29<sup>th</sup>, Karl Jaspers) Chair: Dr. Doo-Bong Chang**

- 15:40 Verification of Shell Elements Performance by Inserting 3-D Model In Finite Elements Analysis with ANSYS Program; Chang Hoon Jun, Jean-Marc Martinez (ITER, France)  
16:00 Characteristics on the Arrangement of the Cooling Water Piping System for ITER and a Fusion Reactor Power Station; KP CHANG, Ingo KUEHN, W.Curd, G. Dell'Orco, D. Gupta, L. Fan (ITER, France)  
16:20 Development & Research of Energy Conservation Buildings in Korea; Hyo Soon Park (Korea Institute of Energy Research, Korea)  
16:40 Product Service Systems as Advanced System Solutions for Sustainability; Myung-Joo Kang, Robert Wimmer (GrAT-Center for Appropriate Technology, Vienna University of Technology, Austria)

### **Session 5: Mechanical Engineering (08:20 – 09:40 30<sup>th</sup>, Friedrich Hegel) Chair: Dr. Man-Wook Han**

- 08:00 Poster introduction  
08:20 A Numerical Study on an Optimum Design of a Cross-flow Power Turbine (CPT); Chul-Ho Kim, Jin-Ho Kim (Seoul National University of Technology, Korea)  
08:40 Non-Iterative MUSIC-Type Algorithm For Reconstructing Two-Dimensional Thin Dielectric Inclusions; Won-Kwang Park<sup>1,2</sup>, Habib AMMARI<sup>2</sup>, Dominique LESSELIER<sup>1</sup> (1. École Supérieure d'Electricité; 2. Ecole Polytechnique)  
09:00 Life Prediction of Automotive Vehicle's Door W/H System Using Finite Element Analysis; Byeong-Sam Kim<sup>1</sup>, KwangSoo Lee<sup>2</sup>, Kyoungwoo Park<sup>2</sup> (1. Pole Universitaire Leonard de Vinci, France; 2. Hoseo University, Korea)  
09:20 Modelling of Low Velocity Impact Damage in Laminated Composites; J. Lee, C. Soutis (University of Sheffield, UK)

### **Session 6: Robotics II (16:00 – 17:20 30<sup>th</sup>, Karl Jaspers) Chair: Dr. Doo-Bong Chang**

- 16:00 The Localisation of the Autonomous Mobile Robots; Man-Wook Han (Vienna University of Technology, Austria)  
16:20 Introduction to Mechatronics & Manufacturing Technology Center of Samsung Electronics; Byeong Hwan Jeon (Samsung Electronics Co. Ltd, Korea)  
16:40 Workshop for Robotics

### **Session 7: Mechanical Engineering (17:40 - 19:00 30<sup>th</sup>, Karl Jaspers) Chair: Dr. Doo-Bong Chang**

- 17:40 3D Out-of-Plane RF MEMS Switch Using Silicon Cantilevers for Power Applications; Joo-Young Choi (Imperial College London, UK)  
18:00 Robust Algebraic Approach for Radar Signal Processing: Noise Filtering, Time-derivative Estimation and Perturbation Estimation; Sungwoo CHOI, Jorge VILLAGRA, Brigitte d'ANDREA-NOVEL (Ecole des Mines de Paris, France)  
18:20 Analysis of Textile Reinforced Concrete at the Micro-Level; Bong-Gu Kang (RWTH Aachen University, Germany)

## **Information and Communications Technology (ICT) Symposium**

Co-chairs:

Prof. Jinho Choi (University of Wales Swansea)  
Prof. Jivka Ovtcharova (University Karlsruhe)



**Prof. Jinho Choi**  
University of Wales Swansea

Information and Communications Technologies (ICTs) have changed our daily life dramatically and improved the quality of life. ICTs have also great impact on sciences and engineering. Korea has been a leader in ICTs and has developed various ICTs and related applications. For example, wireless services and Internet are very popular and have a great impact in promoting business in Korea. In Europe, there have also been active ICT research and Europe-based

Korean researchers have contributed significantly in various areas of ICTs. This ICT symposium will provide a great opportunity to both Korean researchers in Korea and Europe and be able to create collaboration opportunities. There have been various advanced applications of ICT in Europe. In particular, E-health and E-education would be excellent examples. On the other hand, a number of advanced ICTs are available in Korea. Therefore, this symposium can be an excellent place where advanced ICTs can meet futuristic applications.



**Prof. Jivka Ovtcharova**  
University Karlsruhe

**This symposium contains 2 sessions;**

**Session 8: Information and Communication Technology**  
**15:40 – 17:00 August 29<sup>th</sup>, 2008**

**Session 9: Information and Communication Technology**  
**16:00 – 17:20 August 30<sup>th</sup>, 2008**

## **Information and Communication Technology (ICT)**

### **Session 8 (15:40 – 17:00 29<sup>th</sup>, Franz Kafka) Chair: Prof. Jinho Choi**

- 15:40 R&D activities of the Knowledge Integration Platform for REACH; Moon Jung Kang (KIST Europe Forschungsgesellschaft, Germany)
- 16:00 A negotiation composition model for agent base eMarketplaces; Habin Lee (Brunel University, UK)
- 16:20 Efficient and Secure Asset Tracking Across Multiple Domains; Jin-Wook Byun (Pyeontaek University, Korea), Jihoon Cho (Royal Holloway University, UK)
- 16:40 State of the Art in Designer's cognitive activities and Computational support; Jieun Kim, Carole Bouchard, Jean-François Omhovre, Améziane Ouassat (Arts et Metiers ParisTech, France)

### **Session 9 (16:00 – 17:20 30<sup>th</sup>, Franz Kafka) Chair: Prof. Jivka Ovtcharova**

- 16:00 Discovering Technology Intelligence from Document Data in an Organization; Sungjoo Lee, Letizia Mortana, Rob Phaal, Crive Kerr, David Probert (University of Cambridge, UK)
- 16:20 Wireless Broadcast with Network Coding: Dynamic Rate Selection; Song Yean Cho (Ecole Polytechnique, France)
- 16:40 High-Voltage IC Technology Implemented in a Standard Submicron CMOS Process; Jong Mun Park (TCAD & Process Development, Austria)
- 17:00 A New Usability Problem Classification Scheme Based on Abstraction Hierarchy of Design Knowledge; Dong-Han Ham (Middlesex University, UK)

## **Life and Natural Sciences (LNS) Symposium**

Co-chair:

Prof. Young-Hyang Park (Museum National d'Histoire Naturelle)  
Prof. Tjoung-Won Park-Simon (University Hannover)



**Prof. Young-Hyang Park**  
Museum National  
d'Histoire Naturelle

As forming the fundamental basis for the applied sciences and diverse modern technologies, natural sciences such as physics, chemistry, biology, astronomy, and earth sciences are rooted on a rational approach to the study of the universe at all scales, from subatomic to astronomic scales, to understand the obeying rules or laws of natural origin. The so-called "hard science" disciplines such as physics, astronomy, meteorology, physical oceanography, and geophysics, rely heavily on mathematics as the logical framework for formulation and quantification of principles.

Unfortunately, in the nowadays "all-economy-related T-dominating world" it is fair to say that most disciplines of these basic sciences are disappointingly "unpopular" in terms of funding and posts. Despite of this worldwide tendency of handicap, we hope to discover in this EKC conference a number of promising young Korean scientists in Europe who struggle lonely to push ahead the heavy wheel of natural sciences.



**Prof. Tjoung-Won Park**  
University Hannover

**This symposium contains 5 sessions;**

**Session 10: Environment**  
**08:00 – 09:40 August 29<sup>th</sup>, 2008**

**Session 11: Basic Science**  
**14:30 – 15:30 August 29<sup>th</sup>, 2008**

**Session 12: Poster Presentation**  
**15:40 – 17:00 August 29<sup>th</sup>, 2008**

**Session 13: Life Science I**  
**08:00 – 09:40 August 30<sup>th</sup>, 2008**

**Session 14: Life Science II**  
**10:00 – 12:00 August 30<sup>th</sup>, 2008**

## **Life and Natural Sciences (LNS)**

### **Session 10: Environment (08:00 – 09:40 29<sup>th</sup>, Franz Kafka) Chair: Prof. Young-Hyang Park**

- 08:00 The Fawn Trough Current across the Kerguelen Plateau: a bottleneck for the Antarctic Circumpolar flow; Young-Hyang Park (Museum National d'histoire naturelle, France)  
08:20 Comparison of Eco-industrial Development between the UK and Korea; Dowon Kim, Jane C. Powell (University of East Anglia, UK)  
08:40 Multi-objective Environmental/Economic Dispatch using the Bees Algorithm with Weighted Sum; Ji Young Lee (Cardiff University, UK)  
09:00 Environmentally friendly approach electrospinning of polyelectrolyte from aqueous polymer solutions; Miran Yu, Helga Thomas, Martin Möller (RWTH Aachen University, Germany)  
09:20 Single Atom Interferometer; Jai-Min Choi (University of Bonn, Germany)

### **Session 11: Basic Science (14:30 – 15:30 29<sup>th</sup>, Friedrich Hegel) Chair: Prof. Young-Hyang Park**

- 14:30 Particle Physics Experiment on the International Space Station; Chan Hoon Chung (RWTH Aachen University, Germany)  
14:50 Towards transverse laser cooling of an indium atomic beam; Jae-Ihn Kim (University of Bonn, Germany)  
15:10 On applications of Semiparametric Multiple Index Regression; Eun Jung KIM (Université Paris VI, France)

### **Session 12: Poster Presentation (15:40 – 17:00 29<sup>th</sup>, Ernst Bloch) Chair: Prof. Young-Hyang Park**

### **Session 13: Life Science I (08:00 – 09:40 30<sup>th</sup>, Karl Jaspers) Chair: Prof. Tjoung-Won Park-Simon**

- 08:00 Electrical Impedance Spectroscopy for Intravascular Diagnosis of Atherosclerosis; Sungbo Cho (Fraunhofer Institute for Biomedical Engineering, Germany)  
08:20 Cell based biological assay using microfluidics; Jung-Uk Shim, Luis Olguin, Florian Hollfelder, Chris Abell, Wilhelm Huck (University of Cambridge, UK)  
08:40 Effects of Methylation Inhibition on Cell Proliferation and Metastasis of Human Breast Cancer Cells; Seok Heo (Medical University Vienna, Austria), Sungyoul Hong (Sungkyunkwan University, Korea)  
09:00 Mathematical modelling of the impact of cervical cancer vaccine introduction in the United Kingdom; Yoon Hong Choi (Department Centre for Infections Health protection agency, UK)  
09:20 Alveolar Bone Loss: Extraction and Implant placement – the only way out?; Ti-Sun Kim (University Hospital of Heidelberg, Germany)

### **Session 14: Life Science II (10:00 – 12:00 30<sup>th</sup>, Friedrich Hegel) Chair: Prof. Young-Hyang Park**

- 10:00 Phage modifications for various applications; Chang Hoon Nam (KIST Europe Forschungs-gesellschaft, Germany)  
10:20 The Thrill-Effect in medical treatment (esp. music-therapy) - Thrill effect as a therapeutic tool in clinical health care; Eun-Jeong Lee (University of Heidelberg, Germany)  
10:40 Heat and cold stress indices for people exposed to our changing climate; JuYoun Kwon, Ken Parsons (Loughborough University, UK)  
11:00 Understanding the NO-sensing mechanism at molecular level; Byung-Kuk Yoo<sup>1</sup>, Isabelle Lamarre<sup>1</sup>, Jean-Louis Martin<sup>1</sup>, Colin R. Andrew<sup>2</sup>, Pierre Nioche<sup>3</sup>, Michel Negrerie<sup>1</sup> (1. Ecole Polytechnique, France; 2. Eastern Oregon University, USA; 3. Université Paris V, France)  
11:20 Gel-based mass spectrometric analysis of recombinant GABA<sub>A</sub> receptor subunits representing strongly hydrophobic transmembrane proteins; Sung Ung Kang, Karoline Fuchs, Werner Sieghart, and Gert Lubec (Medical University of Vienna, Austria)  
11:40 Immune cells as target oriented living drug delivery system; Ute Steinfeld (KIST Europe Forschungs-gesellschaft, Germany)

## **Forums**

## **Energy and Environmental Technology Forum**

*Environmental experts from Korea and the EU will meet and discuss the following subject: 'EU Korean SIG E forum on curbing climate change: what can the EU-Korea network bring into action?'*

## **Women in Science and Engineering Forum**

*This forum is intended to provide women in science and engineering with a platform for exchanging information and the creation of a network between the participants living in the different EU countries. Leading female scientists and engineers will be invited from Korea and the EU to speak of their own experiences in their working environments.*

## **Technopark and Cluster Information Forum**

*Germany is an export-oriented and high-tech country which has a lack of natural resources, similarly to Korea. The formation of technology clusters has shown to be an effective vehicle in both countries to develop new products and exports in high-tech industries. Representatives from leading technoparks and high-tech clusters from Korea and Germany will meet to exchange their knowledge and experiences and to look for opportunities to co-operate to a mutual benefit.*

## **European Young Generation Forum**

*Each year since 2002, the Korean Federation of Science and Technology Societies (KOFST) has hosted the Young Generation Forum (YGF) to share the Korean vision of science and technology in the 21st century by bringing together in Korea young Korean scientists and engineers from all over the world. The goal of this forum is to provide an opportunity to the participants from EU countries in the previous YGF's to come together, create a network within the EU and form a basis for a continuing exchange of information.*

## **Energy and Environmental Technology Forum**

Co-chairs:

- Dr. Jamin Kim (University of Strathclyde)  
Dr. Wonsun Park (Leibniz Institute of Marine Sciences)



Dr. Wonsun Park  
Leibniz Institute  
of Marine Sciences

**This Forum contains 3 sections;**

**1<sup>st</sup> section: Strategy**  
**17:20 – 19:00 August 29<sup>th</sup>, 2008**

**2<sup>nd</sup> section: Workshop I - Technology**  
**08:00 – 09:40 August 30<sup>th</sup>, 2008**

**3<sup>rd</sup> section: Workshop II - Discussion**  
**16:00 – 17:20 August 30<sup>th</sup>, 2008**



Dr. Jamin Kim  
University of Strathclyde

### **Energy and Environmental Technology Forum: Strategy**

This forum will address business strategies, policies, R&D programs, international politics associated with energy and environment issues. The forum consists of 4 presentations and an invited lecture.

The invited lecture contains the following points:

- Where Russia's Gas supply sources are located;
- How Gazprom's Asia policy was developed since 1997;
- How China's Gas Industry's expansion was made and China has responded Russia's Asian Gas Policy;
- How Korea's Gas Industry's expansion was made and Korea has responded Russia's Asian Gas Policy.

17:20 Climate Change and Energy Management - Business Challenge or Opportunity?; Chung Hee Kim (Strathclyde Business school)

17:40 Status of the Climate Change policies in Korea; Il Young Oh (Centre for Environmental Strategy, University of Surrey)

18:00 Strategic Plan for Energy Conservation of Building Sector in Korea; Seung Eon Lee (Korea Institute of Construction Technology)

18:20 Invited Lecture: Russia's Asian Gas Policy and its implications towards Northeast Asia; Keun Wook Paik (Oxford Institute for Energy Studies)

19:00 Close

### **Workshop I: Technology**

This session will focus on the technical aspects of alternative energy, supply network operation and energy utilisation. R&D trends will be presented by invited speakers from EU based organisations and Korea. After presentations, an interactive session between speakers and audiences will be held to discuss prospective collaborative works between EU and Korea.

Session 1: R&D trends of energy technologies in EU and Korea

08:00 Trends in Microbial Fuel Cells for the Environmental Energy Harvest; Sung Taek Oh (University of Glasgow)

08:20 International Thermo-nuclear Experimental Reactor (ITER)... the way to Fusion Energy; Yong Hwan Kim(ITER)

08:40 Development of optimization system for integrated management on wide area energy network; Lae-Hyun Kim (Seoul National University of Technology)

09:00 The Integrated Operations of Building Engineering Development by Low-End Energy Uses;  
Soo Cho (Korea Institute of Energy Research)  
09:20 Q&A and Panel Discussion  
10:00 close

## **Workshop II: Discussion**

Session 2: EU-Korea network  
Can we make mutual benefits through the EU-Korea network of energy environment experts?  
What challenges are we facing to establish the network?

## **Women in Science and Engineering Forum**

Co-chairs:

Dr. Myoung Ah Kang (ISIMA; Universite Blaise Pascal)  
Dip-Ing. Bo-Hyun Lee (University Erlangen)



Dipl-Ing. Bo-Hyun Lee  
University Erlangen

Women are making inroads and are becoming represented in fields across science and engineering. Although more women obtain academic degree by and by and feminisation of the workforce is getting obvious, under-representation of women in the research workforce continued. Especially the Korean women working or studying in Europe hardly have opportunity to share their concern with people who probably faced the same situation. Through this forum the network of Korean women in science and engineering will be established and strengthened, and this will facilitate communication and cooperation between female scientists and engineers to promote their career development and success.

**This forum contains 2 sessions:**

**Opening Session**  
**10:00 – 12:00 August 30<sup>th</sup>, 2008**

**Workshop**  
**17:40 – 19:00 August 30<sup>th</sup>, 2008**

### **Opening Session**

Opening and congratulatory speech by Dr. Seung-Deog Yoo

Invited Speech

Dr. Sun Hwa Hahn (KISTI)

Title: Breaking the glass ceiling : a personal experience

Prof. Dr. Dr.-Ing. Jivka Ovtcharova (University Karlsruhe)

Title: The feminine dimension – how can women add value to design and engineering

Background information on the inauguration of Women in Science and Engineering Forum

### **Workshop**

Chair: Myung Joo Kang (Gruppe Angepasste Technologie/Centre for Appropriate Technology)

This session is only for female participants of the EKC 2008. A senior scientist with much experience on the scene is invited to give a talk. Afterwards a new discussion form "World Café" will be held to exchange views. Through the World Café the participants become acquainted with each other.

Discussion: "Superwoman VS. Wonderwoman"

At 'Women in Science and Engineering Forum', a simplified World Café will facilitate conversations and networking among participants in an informal café atmosphere.

## **Technopark and Cluster Information Forum**

Co-chairs:

Dr. Keun-Ho Roh (Chungbuk Technopark, Korea)

Mr. Herbert Hoffmann (Technologiefabrik Karlsruhe, Germany)



Mr. Herbert Hoffmann  
Technologiefabrik Karlsruhe

As a part of EKC2008 there is a special meeting of experts in the field of technology transfer and management of exchange of experience and information.

Everyone is invited to discuss about this topic. After the forum we have a meeting with experts and discuss how to improve international cooperation between Europe and Korea. We are happy to meet managers of technology parks in Heidelberg, Mannheim, Stuttgart and Karlsruhe and some experts of Korean institutions.

### **Participants**

- Technologiepark Heidelberg
- Technologiefabrik Karlsruhe
- TTI GmbH- die Technologie-Transfer-Initiativean der Universität Stuttgart
- MAFINEX-Technologiezentrum GmbH
  
- Chungbuk Technopark
- Gangwon Technopark
- Gyeonggi Bio Center
- Changwon National University

**This forum contains 2 sessions;**

**Opening Session**  
**14:30 – 15:30 August 29<sup>th</sup>, 2008**

**Meeting Session**  
**15:40 – 17:00 August 29<sup>th</sup>, 2008**

## **European Young Generation Forum**

Co-chairs:

Dr. Chin-Hee Chung (University of Heidelberg)  
Mr. Kyoungjin Yoo (University of London)



Dr. Chin-Hee Chung  
University of Heidelberg

The "Young Scientists and Engineers (YSE)" association was established in October 2004 and is a chapter of "The Korean Scientists' and Engineers' Association in Germany (VEKNI)". YSE was founded in order to unite and promote young Korean-German scientists and engineers (1.5 and 2nd generation) and help them establish a network with similar national and international organizations. Since its foundation, YSE has been actively involved in different conferences, seminars and events.

## **Schedule**

**14:00 - 14:10** Greeting

Dr. Yoo, Chair of the EKC2008  
The Korean Scientists' and Engineers' Association in Germany (VEKNI)

**14:10 - 14:15** Briefing

Ms. Hannah Lee, Germany (VEKNI) & Dr. Chin-Hee Chung, Germany (VEKNI)

**14:15 - 14:30** Round of Introductions (every participant)

**14:30 - 15:00** Presentation about LG Electronics

Dr. Sungsu Han, LG Electronics, Korea

**15:00 - 15:30** Presentation: "Working as physicist in IP department of a global company"

Dr. Byong-Hak Kim, Senior Consultant (Corporate Intellectual Property, Robert Bosch GmbH, Germany)

**15:30 - 16:00** Presentation: "The Young Generation Forum 2008 in Korea"

Mr. Jan van den Hurk, Student (Electrical Engineering, RWTH Aachen University, Germany)

Mr. Martin Tritschler, Student (Industrial Engineering and Management, Technical University of Kaiserslautern, Germany)

**16:00 - 16:15** Coffee Break

**16:15 - 17:00** Group Work

**17:00 - 17:30** Presentation of Group Work

**17:30 - 18:00** Summary

**21:00 - Open End** Unofficial Pub-Crawl

# Poster Abstracts

## Poster 1

### Multigap Pseudospark Switch for SIS100/300

Byung-Joon Lee<sup>1</sup>, J. Jacoby<sup>1</sup>, K. Frank<sup>2</sup>, I. Petzenhauser<sup>3</sup>, and U. Blell<sup>3</sup>

<sup>1)</sup> Institute of Applied Physics, J.W.G. University of Frankfurt, D-60438 Frankfurt, Germany

<sup>2)</sup> Texas Tech University, Lubbock, USA <sup>3)</sup> Gesellschaft fuer Schwerionenforschung mbH, Darmstadt, Germany

A new accelerator complex called FAIR (Facility for Antiproton and Ion Research) is under the way to be built at the Gesellschaft fuer Schwerionenforschung mbH (GSI) in Darmstadt, Germany. One of the main components of this facility will be the SIS100/300 heavy ion synchrotron. To operate injection/extraction kicker magnet systems, pulse forming networks (PFNs) with high-voltage switches are needed. The switch has to be specified to handle 70 kV, currents up to 6 kA and pulse durations of up to 9  $\mu$ s. The maximum repetition rate will be 4 Hz and the current rise rate has to exceed at least  $3.5 \times 10^{10}$  A/s. Those parameters have to be guaranteed simultaneously with a lifetime of at least 108 shots. Low-pressure gas discharge switches, e.g. the thyratron and the pseudospark switch, are at the moment the most appropriate choice for this application. Though multigap thyatrators are commercially available and mature switches further development work is necessary, too. The pseudospark switch, which is also known as cold-cathode thyratron, is still in the prototype development phase.

Principally low-pressure gas discharge switches are limited to a hold-off voltage below 40 kV per gap. To handle 70 kV reliably for more than 108 discharges, a three-gap pseudospark switch is proposed. To trigger this switch there are two concepts: Every gap is triggered separately or only the grounded gap is triggered and the next gaps break down successively. Actually the concept is to do the conventional one trigger design as it is used in multigap thyatrators

This has the advantage of simple switch design and only one trigger pulse generator is needed per switch. However, it pays for a worse delay and jitter. To minimize the overall breakdown delay and jitter of the three gaps, the drift space between the gaps has to be designed to optimize the charge transfer between the gaps. In a two-gap laboratory prototype, this design produced very good results. A three-gap sealed-off switch with this new layout of the drift space is under construction. Despite of the necessity of three trigger high-dielectric trigger units, separately triggered gaps do not need the mandatory drift spaces. This might make the overall design simpler as well as the external wiring. Test results with a former prototype, developed at CERN, will be reported.

## Poster 2

### Multi-micro capillary discharges as an intense vacuum ultra violet emission source

Byung-Joon Lee\* Joachim Jacoby\* and Konstantinos P. Giapis\*\*

\*Institute of Applied Physics, J.W.G University of Frankfurt, D-60438 Frankfurt, Germany

\*\*Division of Chemistry and Chemical Engineering California Institute of Technology, Pasadena, California 91125

For a decade, microhollow cathode discharges (MHCD) have been investigated in DC and pulsed mode as intense VUV radiation sources for excimer emission. We have found that increasing the discharge current at fixed pressure, the discharge at the cathode side expands beyond the rim of the bore hole to the outer surface of the cathode and it proved by the experiment as well as the simulation. This is equivalent to an increase in the solid angle of VUV emission, which is disadvantageous for improving or amplifying VUV emission by stacking MHCD devices in series. This limitation of the planar MHCDs can be overcome by using the capillary microdischarges described in reference[1]. These novel microdischarges replace the planar cathode with a metal capillary tube and have been shown to deliver emission characteristics comparable to that of the MHCDs, with the advantage that VUV emission occurs preferably on-axis. In this presentation, we report on a comparison of the emission characteristics of single MHCDs versus capillary microdischarges in the cw mode. We also examine the influence of forced gas flow in both devices. Finally, we present results from experiments with precisely aligned multiple capillary microdischarges.

## Poster 3

### Investigation of SnSe, SnSe<sub>2</sub>, and Sn<sub>2</sub>Se<sub>3</sub> alloys for phase change memory applications

Kyung-Min Chung, Daniel Wamwangi, Michael Woda, Matthias Wuttig

I. Physikalisches Institut, RWTH Aachen, 52065 Aachen, Germany

SnSe, SnSe<sub>2</sub>, and Sn<sub>2</sub>Se<sub>3</sub> alloys have been studied to explore their suitability as new phase change alloys for electronic memory applications. The temperature dependence of the structural and electrical properties of these alloys has been determined and compared with that of GeTe. A large electrical resistance contrast of more than five orders of magnitude is achieved for SnSe<sub>2</sub> and Sn<sub>2</sub>Se<sub>3</sub> alloys upon crystallization. X-ray diffraction measurements show that the transition in sheet resistance is accompanied by crystallization. The activation energy for crystallization of SnSe, SnSe<sub>2</sub>, and Sn<sub>2</sub>Se<sub>3</sub> has been determined. The microstructure of these alloys has been investigated by atomic force microscopy measurements. X-ray reflection measurements reveal density increases of 5.0%, 17.0%, and 9.1% upon crystallization for the different alloys.

## Poster 4

### Molecular weight dependence of polymeric insulators on the leakage current in organic thin film transistors

Hyeok Kim

ITODYS, CNRS 7086 University of Paris 7, Paris, France

Organic thin film transistors which have cost advantage to fabricate flexible devices have been an issue over the decades. However, no research has been performed about molecular weight of polymeric

insulators in organic thin film transistors. Moreover, a lot of research has not been carried out about the leakage current, that is one of the most important characteristics of organic thin film transistors.

In this paper, the change of leakage current in organic thin film transistors has been analyzed physically as molecular weight of polymeric insulator varied. Especially, when binary mixture of polymers which had two molecular weights was used as the gate insulator, the leakage current decreased over ten times linearly in organic thin film transistors than when polymer which had a unique molecular weight was used as gate insulator. It is established the reason that hydroxyl group density of polymeric insulators is distinguished according to the change of molecular weight when the polymeric insulators are thermally crosslinked.

#### Poster 5

#### Differential Effect of DLx2 in Neural Precursors Derived from the Subventricular zone and the Hippocampal Subependyma

Yongjoon Suh<sup>1</sup>, Carmen Carrillo-García<sup>2</sup>,  
Francesca Ciccolini<sup>1</sup>

<sup>1</sup>Department of Neurobiology, Interdisciplinary Center for Neurosciences (IZN), University of Heidelberg, Im Neuenheimer Feld 364, 69120 Heidelberg, Germany.

<sup>2</sup>Department of Neuroanatomy, Center for Neurosciences (IZN), University of Heidelberg, Im Neuenheimer Feld 306, 69120 Heidelberg, Germany.

Neurogenesis in adult brain has a great potential to develop new strategies to treat a number of incurable brain disorders, from neurodegenerative disease to brain and spinal cord injuries, multifocal diseases and tumors. To realize the potential of neural stem cell (NSC) therapy, it requires knowledge of their accurate identity and the mechanisms by which their proliferation/differentiation are regulated in their niche and the signals responsible for their commitment to specific cell types.

Neural stem cells (NSCs) are self-renewing multipotent precursors capable of generating both neurons and macroglia. NSCs persist postnatally in the subventricular zone (SVZ), the germinal epithelium lining the lateral ventricle and the subgranular zone (SGZ) of the dentate gyrus (DG) in the hippocampus (1). In the SVZ, DLX2 homeobox transcription factor is expressed by rapidly proliferating but not quiescent stem cells (2). Though neuroblasts also express DLX2, however, in contrast to stem cells they do not form clones and do not express epidermal growth factor receptor (EGFR). The mechanisms about how DLX2 affects different SVZ precursor types are not clear yet. It is also not clear whether a similar cellular organization is present in more posterior regions of the subependyma, such as in the hippocampus.

Here we have isolated clone-forming cells (EGFR+) from both the SVZ and the subependyma of the hippocampus of postnatal and embryonic mice at day 18 of embryonic development (E18). Both cell populations expressed Nkx2.1, a marker for medial ganglionic eminence indicating their origin is same. However, cells derived from the hippocampal subependyma expressed lower levels of Egfr and Dlx2 mRNAs and were less neurogenic and less capable of self-renewal compared to their SVZ counterpart.

Forced expression of DLX2 in both SVZ and hippocampus cells increased the proliferative and neurogenic potential of clone forming cells. However, Dlx2 overexpression expanded the number of clone-forming cells only in the SVZ cells but not in the hippocampus cells. We show that this effect of DLX2 on increase of clone-forming cells requires EGFR signaling and is due to an increase in the proportion of cells that acquire high levels of EGFR expression. Taken together, neural precursors in the SVZ and in the hippocampal subependyma, although both originated from the basal ganglia, have differential potential of stemness and effect of Dlx2, suggesting they are intrinsically different cell populations.

#### Poster 6

#### Lifestyle factors and p53 mutations in sporadic colorectal cancer in the EPIC-Norfolk study

Jin Young Park<sup>1</sup>, Panagiota N. Mitrou<sup>2</sup>, Jennifer Keen<sup>3</sup>, Mark Arends<sup>4</sup>, Robert Luben<sup>1</sup>, Alison McTaggart<sup>6</sup>, Nicholas Wareham<sup>5</sup>, Kay-Tee Khaw<sup>1</sup>, and Sheila Bingham<sup>6</sup>

<sup>1</sup>Department of Public Health and Primary Care, University of Cambridge <sup>2</sup>World Cancer Research Fund International, London <sup>3</sup>Medical Research Council Dunn Human Nutrition Unit, Cambridge <sup>4</sup>Department of Pathology, University of Cambridge, Addenbrooke's Hospital <sup>5</sup>Medical Research Council Epidemiology Unit, Cambridge <sup>6</sup>Medical Research Council Centre for Nutritional Epidemiology in Cancer Prevention and Survival, Cambridge

The p53 tumour suppressor gene is one of the most commonly altered genes in the development of colorectal cancer (CRC). p53 genetic changes may therefore be associated with known or postulated risk factors for CRC. The aim of this study was to examine whether diet and other lifestyle factors relate to p53 mutations (including location and type of mutation) in colorectal tumours in the Norfolk arm of the European Prospective Investigation into Cancer and Nutrition (EPIC) Study. During 10 years of follow-up, 174 CRC cases were analysed for p53 somatic mutations by direct sequencing. Descriptive analyses were performed to explore differences in p53 mutation patterns by diet and other lifestyle factors recorded at baseline using detailed diet and lifestyle questionnaires. p53 mutations were found in 30.5% of all colorectal tumours with GC>AT being the most frequent mutations. The mean intake of alcohol was significantly higher in CRC patients with p53 mutations compared with those without mutations ( $p=0.02$ ). A similar finding was seen amongst patients with advanced Dukes' stage ( $p=0.05$ ). Significantly higher mean intake of total meat including red meat was also observed in this latter group with p53 mutations ( $p=0.007$  and 0.01 for total meat and red meat, respectively). There were no significant differences with other lifestyle factors including smoking status and physical activity levels. In conclusion, alcohol and meat, especially red meat intake, may play a role in p53 mutated colorectal tumours. This may be particularly true for advanced stages of CRC.

#### Poster 7

#### How Does Inflammation Within The Central Nervous System Cause Paralysis And Blindness?

Woojin Lee

Department of Neuroinflammation, Institute of Neurology, University College London, London, UK

It has recently become clear that neurological deficits in multiple sclerosis (MS) as severe as paralysis, blindness and numbness can arise not only from the demyelination that is characteristic of the disease, but also from the presence of the intense inflammation that is also prominent. Indeed, inflammation can cause profound deficits even in the absence of demyelination<sup>1, 2, 3</sup>, but what mechanisms are responsible remains unclear. This ignorance is important because inflammation is a component of many neurological disorders (including Parkinson's, Alzheimer's and motor neuron disease) and it is likely that the inflammation will also contribute to the deficits in these disorders as well. We use recognised animal models of inflammatory multiple sclerosis lesions to explore the neurological deficits caused, and the mechanisms responsible for the deficits. Different animal (rat) models are used in order to mimic the major types of inflammatory lesion found in MS. These types have been classified as Patterns I, II & III (Pattern IV is uncommon)<sup>4</sup>, and we use different types of experimental autoimmune encephalomyelitis (EAE; including the MOG93-109 model) to mimic Patterns I & II, and the intraspinal injection of lipopolysaccharide (LPS)<sup>5</sup> to mimic Pattern III<sup>6</sup>. There are two methodological steps to this study. The first is to induce inflammatory lesions under general anaesthesia. In one type of lesion, LPS will be injected intraspinally into either the dorsal columns or the ventral horn of the spinal cord, and, in the other type, animals will be immunised using MOG93-109 as an antigen, which will be injected subcutaneously at the base of the tail. The second step is to use electrophysiological techniques to examine function, by assessing axonal function, synaptic transmission (within the CNS and at the neuromuscular junction), and motor neuronal excitability. Synaptic function in the ventral horn will be examined by measuring the H reflex, and F waves will be used as an additional measure of motor neuronal excitability. The responses will be examined serially (e.g. on days 0, 1, 3, 5, 8, 14) so that if a transient deficit is expressed when the animals are transiently symptomatic, as expected, its presence will be revealed.

#### Poster 8

#### **Distribution pattern of wintering gulls in Korea, 1999-2005 – Analyzing the census database using Artificial Neural Networks**

Who-Seung Lee<sup>1,2</sup> and Jeong-Chil Yoo<sup>2</sup>

<sup>1</sup>Division of Environmental and Evolutionary Biology, Institute of Biomedical and Life Sciences, University of Glasgow, Glasgow, UK <sup>2</sup>Department of Biology, Kyung Hee University, Seoul, Republic of Korea

From 1999 to 2005, Korea government carried out the census of wintering seabirds and waterbirds in three coasts (East, West, and South) on the same time and made the census database of wintering populations. According to analyze the database, 26 gulls/terns (13 Larus, 12 Sterna, and 1 Xema) were observed and the total numbers were 383,706 during the study periods. The number of the gulls/terns also significantly increased. We analyzed the pattern of distributions using Artificial Neural Networks - Self Organizing Mapping (SOM). The

distribution of 26 gulls was different in the coasts: 1) in the East coast, Herring Gulls (*Larus argentatus*), Black-tailed Gulls (*Larus crassirostris*), Black-headed Gulls (*Larus ridibundus*), Kamchatka Gulls (*Larus canus*), and Slaty-backed Gulls (*Larus schistisagus*) distributed mainly. 2) In the South coast, Black-tailed Gulls and Herring Gulls distributed mainly. 3) In the West coast, Black-tailed Gulls, Black-headed Gulls, and Herring Gulls distributed mainly. There were no year variations in the numbers of the gulls/terns. After training with SOM, the species were classified into three groups. Each group was associated with the coast separately and the dominant species in each group were difference. In relation to the distribution, there is the different migration pattern of fishes among coasts. Moreover, each coast was close by well-known breeding colonies. Therefore, our results suggested that the different distribution patterns in three coasts in winter were related with the dispersion of breeding pairs as the turning of the season.

#### Poster 9

#### **Isolation and Characterisation of Antibiotic-resistant Actinomycetes from Soil**

Byung-Yong Kim

School of Biology, University of Newcastle, Newcastle upon Tyne, NE1 7RU, UK

Actinomycetes form an integral part of the indigenous soil microflora and there is evidence that the source of many of the antibiotic resistant genes found in pathogenic bacteria may be from the organisms that produce the antibiotics as they need to develop self-protective mechanisms to avoid suicide. In order to estimate the diversity of antibiotic-resistant soil bacteria and reveal the relationships between resistance profiles and the taxonomic positions of the organism, actinomycetes which showed resistance to amoxicillin, oxytetracycline and sulfadiazine were isolated from soil. Four hundred and thirty strains isolated from selective media were assigned to 59 groups based on aerial spore mass colour, substrate mycelium pigmentation and the colour of any diffusible pigments on oatmeal agar. 16S rRNA gene sequencing was carried out on representatives of the colour groups. Most of the strains were classified to the genus of *Streptomyces*, particularly to the *S. griseus* 16S rRNA gene clade. The balances of the strains were found to belong to the genera *Actinomadura*, *Dactylosporangium*, *Micromonospora* and *Streptosporangium*. The isolates were examined to determine their antibiotic resistance profiles. Forty four strains were selected for the antibiotic resistance profiling test. All strains were resistant to amoxicillin, fosfomycin and trimethoprim, but none were resistant to apramycin and minocycline. Single strain showed resistance to 18 antibiotics (44%) tested, which indicate that soil bacteria have high ability to protect themselves from antibiotics and hence might be the origin of resistant gene.

#### Poster 10

#### **An Electrophysiological Approach for Analysis of Functional Recovery after Spinal Cord Injury in Mice**

Hyun Joon Lee<sup>1</sup>, Igor Jakovcevski<sup>1</sup>, Melitta Schachner<sup>1,2</sup>, Andrey Irinchev<sup>1,3</sup>

<sup>1</sup>Center for Molecular Neurobiology Hamburg (ZMNH), University of Hamburg, Hamburg, Germany <sup>2</sup>W. M. Keck Center for Collaborative Neuroscience and Department of Cell Biology and Neuroscience, Rutgers University, Piscataway, U.S.A. <sup>3</sup>Department of Otorhinolaryngology, Friedrich-Schiller-University Jena, Jena, Germany

The Hoffmann (H) reflex is a monosynaptic response of the spinal motoneuron following Ia afferent stimulation. The alteration of H-reflex is often used to address the excitability of motoneuron and its inhibitory regulation after spinal cord injury (SCI) in patients and animal models. We established the H-reflex measurement in the mouse SCI model system in order to be able to apply it to genetically manipulated strains. The H-reflex was elicited by electrical stimulation of the tibial nerve and recorded from plantar muscles to measure the baseline, maximal amplitude and the rate-dependent reduction with increasing frequency of stimulation after SCI. We tested extracellular matrix glycoprotein tenascin-R (TNR), and the adhesion molecule close homolog of L1 (CHL1) deficient mice, previously shown to have better motor recovery after SCI than their littermates. H-reflex measurements were compared to the motor recovery, assessed by the video recording single frame motion analysis, and the morphological study of the synaptic coverage of motoneurons after SCI. The frequency-dependent depression of the H-reflex was similar in both control groups, in agreement with the previous study in rats, but shows a marked genotype- and time-dependent difference in TNR, and CHL1 deficient mice. The increased maximal amplitude of H-reflex in TNR and CHL1 deficient mice indicates the enhanced excitability of motoneurons supporting the better motor recovery. Alterations of posttraumatic synaptic rearrangements on motoneurons after SCI were likely morphological substrate of the enhanced excitability and the better recovery. These experiments suggest that the H-reflex is a useful tool to investigate the physiological changes and understand the relationship between synaptic reinnervation in the spinal cord and the functional outcome after SCI.

**Poster 11  
Importance of Ovarian Lymphangiogenesis in Murine Pregnancy Maintenance**

Seung Tae Lee, Joseph M. Rutkowski, Jong Eun Ihm, Veronique I. Greenwood, Miriella C. Pasquier, Jeffrey A. Hubbell, and Melody A. Swartz

Institute of Bioengineering, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Although developing follicles within the ovary is surrounded by lymphatic vessels, the roles of lymphangiogenesis in folliculogenesis and pregnancy have not been revealed until now. Thus, in this research, we demonstrated a critical role for ovarian lymphangiogenesis in murine reproduction using systemic delivery of mF4-31C1, a specific antagonist antibody to vascular endothelial growth factor receptor (VEGFR)-3. For blocking ovarian lymphangiogenesis, VEGFR-3 neutralization was conducted for two weeks prior to mating and pregnancy, and did not cause any effects on ovarian blood angiogenesis. Preantral follicles retrieved from ovaries of mF4-31C1 treated mice showed no significant difference in follicle development and maturation in vitro compared to control. Likewise, no

significant difference in the number of ovulated oocytes and fertilized embryo, preimplantation development and implantation were found. However, all pregnancies of mF4-31C1 treated mice could not be maintained successfully and fetal defects and miscarriage in their uterus were observed. Subsequently, when normal embryos retrieved from mF4-31C1 untreated mice were transferred into uterus of mF4-31C1 treated surrogate mother, the same fetal deficiency was found. Whereas, transplantation of embryos retrieved from mF4-31C1 treated female mice into uterus of mF4-31C1 untreated surrogate mother showed normal pregnancy and full term development of fetus. Moreover, treatment of mF4-31C1 exhibited significant reduction of serum level of progesterone and estradiol, which are hormones secreted from the ovarian corpus luteum during pregnancy. Accordingly, these results propose that lymphatic capillaries are important to maintain an ovarian hormonal environment necessary for fetal development and pregnancy.

**Poster 12**

**Memorialmuseum in Seoul**

CHUL-WOO HYUN

Moser Architekten Ziviltechniker, Vienna , Austria

A few years ago, when the Seongsu-Bridge and then the Sampoong-Shopping Mall collapsed, these catastrophes meant a backlash for Korea's progress. Korea put all effort in it for catching up with western countries. The last 50 years a lot of accidents took place, which arise from the result of human failure and from the disrupted self-confidence of South Korea. South Korea got named "Disaster Kingdom". That time, quantity and speed have been much more important than quality. The consequences have been collapsing buildings, killing hundreds of people. Nevertheless, all these catastrophes, which cause so many victims, fall into oblivion and only a few memorials remind on these happenings. Even though technological improvements make life more and more comfortable and save regarding natural hazards, also more and more risks for humans arise because of technology and humans applying it. People have to be reminded on catastrophes, and should visit these places over and over again to call into consciousness of where we came from, what we did, what happened and what we have to do to prevent happenings like that.

Looking back into history, the place of the Sampoong Shopping Mall was once a grave mound for court ladies. The years after the catastrophe from 1995 to 2000, nobody cared about this area. Relatives of the victims called for a memorial on that place and protested heavily, when the owners of this area decided building luxury apartments there. Today, a 3 blocks wide and 120 high Acrovista was finished in 2004 which is still, till today, 2008, almost empty. We think that it is essential that we should cater on the history of this certain place. Building housing estates on such a bonded place, even though it is a posh bit of Seoul, is questionable.

For reminding on these numerous catastrophes and for improving the consciousness for security and quality in South Korea, we propose building a memorial museum for this catastrophe, caused of human failure. A place where relatives can remember their family members and victims.

### Poster 13

#### **Investigations of the Resazurin/Resorufin Ratio in the Bacterial Contact Test to Minimize Sediment Disturbance**

Won Kon, Kim

Department of Environmental Technology and Energy Economics Technical University Hamburg-Harburg, Hamburg, Germany

This study is to investigate the ratio of Resazurin and Resorufin in the bacteria contact test to minimize sediment disturbance. Resazurin which has 2 other states as Resorufin and Dihydro-resorufin on different conditions is changed into another state by electronic charge or oxygen consumption like as metabolism in a solution. Resazurin has been used to find out the activities of bacteria in milk. When it comes to handle in sediment, there are many kinds of influential factors unlike milk. These elements are used as an indicator in this experiment with diverse constitution of sediment. The results are derived statically, in special affected from the characteristic of kinds of sediment and the method to extract out from the particles of diverse constitution of sediment. As reference, Resazurin shown a blue color changed into resorufin, a red one, by activities of microorganism. Being more reactions, Resorufin changed into Dihydro-resorufin which has no color. Because of this character of Dihydro-resorufin, it could not be measured by photometry. Here are graphs and results through various conditions of experiments with Resazurin, Resorufin and Sediment. Moreover, this study shows the influential degree of several factors except bacterial with some experiment.

### Poster 14

#### **Intra-annual Cambial Dynamics of Trees as Benchmark in Views of Climate Change**

Jeong-Wook Seo<sup>1</sup>, Dieter Eckstein<sup>1</sup> and Uwe Schmitt<sup>2</sup>

<sup>1</sup>Division Wood Biology, Department of Wood Science, University of Hamburg, Hamburg, Germany <sup>2</sup>Federal Research Institute for Rural Areas, Forestry and Fisheries, Hamburg, Germany

More than 50 years ago, it was already repeatedly highlighted that summer temperature is the principal controller for tree growth in northern ecotones. Because the trees respond to summer temperature very sensitively, their tree-ring widths have been used as a proxy to investigate the variation of summer temperature and to provide a dataset to predict climate change in near future.

Cambium is the cell layer occupying just a very small part around a tree, however, it is responsible for producing all kinds of wood cells. Moreover, the cambium is highly responsive to wounding (Larson, 1994). This capacity was used by Wolter as early as in 1968 to implement the 'pinning technique'. By this technique, 'time stamps' are established permanently in the newly forming wood which later can retrospectively be applied to monitor tree growth with a high time resolution. The pinning technique functions in that a thin needle is pushed through the bark and the cambium layer thus leaving a wound mark on the microscopic level (Schmitt et al., 2004;

Seo et al., 2007); then, the needle is pulled out again.

The current study was carried out with Scots pine (*Pinus sylvestris* L.) near its northern border of distribution in the boreal forest vegetation zone of Finland from 2000 to 2004. The 'time stamps' were established every week using a needle of 1.2 mm of diameter. For the investigation on the microscopic level, small samples with the 'time stamps' were prepared using a microtome. During monitoring, the cambium began wood formation when the heat sum, that means the accumulated values of temperature above +5°C from January (details in Sarvas, 1972), reached 12.5 % of the long-term mean value from 1961 (Seo et al., 2008b). The highest intensity of wood formation occurred not in the warmest period but when the duration of daylight was maximal during the growing season (Seo et al., 2008a). As several recent publications (Wilmking & Juday, 2005; D'Arrigo et al., 2007) show, the trees close to their northern distribution indicate a negative relationship with early summer temperature. Our monitoring data set may serve as a benchmark for future monitoring activities in ecologically similar sub-regions.

### Poster 15

#### **Tropical Pacific Climate and its Response to Global Warming in the Kiel Climate Model\***

Wonsun Park

Leibniz Institute of Marine Sciences at the University of Kiel, Kiel, Germany

A new, non-flux corrected, global climate model is introduced, the Kiel Climate Model (KCM), which will be used to study internal climate variability from interannual to millennial time scales and climate predictability of the first and second kind. The version described here is a coarse resolution version that will be employed in extended-range integrations of several millennia. KCM's performance in the Tropical Pacific with respect to mean state, annual cycle, and El Niño/Southern Oscillation (ENSO) is described. Additionally, the Tropical Pacific response to global warming is studied.

Overall, climate drift in a multi-century control integration is small. However, KCM exhibits an equatorial cold bias at the surface of the order 1°C, while strong warm biases of several degrees are simulated in the eastern Tropical Pacific on both sides off the equator, with maxima near the coasts. The annual and semi-annual cycles are realistically simulated in the eastern and western equatorial Pacific, respectively. ENSO performance compares favorably to observations with respect to both amplitude and period.

An ensemble of eight greenhouse warming simulations was performed, in which the CO<sub>2</sub> concentration was increased by 1% per year until doubling was reached, and stabilized thereafter. Warming of equatorial Pacific sea surface temperature (SST) is, to first order, zonally symmetric and leads to a sharpening of the thermocline. ENSO variability increases due to global warming: During the 30 year period after CO<sub>2</sub> doubling, the ensemble mean standard deviation of Niño3 SST anomalies is increased by 26% relative to the control, and power in the ENSO band is almost doubled. The increased variability is due to both a strengthened (22%) thermocline feedback and an enhanced (52%) atmospheric sensitivity to SST,

both are associated with changes in the basic state. Although variability increases in the mean, there is a large spread among ensemble members and hence a finite probability that in the "model world" no change in ENSO would be observed.

**Poster 16**  
**TiO<sub>2</sub> Nanotubes for Dye-Sensitized Solar Cells**

D. Kim<sup>1</sup>, A. Ghicov<sup>1</sup>, J.M. Macak<sup>1</sup>, R. Hahn<sup>1</sup>, S.P. Albu<sup>1</sup>, T. Stergiopoulos<sup>2</sup>, D. Tsoukleris<sup>2</sup>, A.G. Kontos<sup>2</sup>, J. Kunze<sup>1</sup>, P. Falaras<sup>2</sup>, P. Schmuki<sup>1</sup>

<sup>1</sup>University of Erlangen-Nuremberg, Dept. of Materials Sci., Martensstr. 7, 91058 Erlangen, Germany <sup>2</sup>Institute of Physical Chemistry, NCSR "Demokritos", 15310 Aghia Paraskevi Attikis, Athens, Greece

In the presentation, we demonstrate that self-organized TiO<sub>2</sub> nanotubular layers are a highly efficient material for dye-sensitized solar cells. We replaced the nanocrystalline TiO<sub>2</sub> particles in the DSSCs system with anodic TiO<sub>2</sub> nanotubes made by electrochemical anodization in fluoride containing electrolytes. Furthermore, we optimised the system with different tube morphologies, crystallization and dye-sensitisation processes. Exploiting TiO<sub>2</sub> nanotubes eliminates the grain boundary effect and hence can significantly enhance the light conversion efficiency.

**Poster 17**  
**Morphological and photoelectrochemical properties of TiO<sub>2</sub> based nanotubes**

Yoon-Chae Nah, Andrei Gicov, Doohun Kim, and Patrik Schmuki

Department of Materials Science, WW4-LKO, University of Erlangen-Nuremberg, Erlangen, Germany

TiO<sub>2</sub> nanotubes have been extensively studied due to their potential applications such as photocatalysts, photoelectrolysis, photovoltaics, and electrochromic devices. TiO<sub>2</sub> nanotubes with different sizes and various geometrical shapes were prepared using various physical and chemical synthesis routes including sol-gel, template synthesis, hydrothermal process, and anodization. Among these various methods, a simple electrochemical anodization provides self-organized and ordered TiO<sub>2</sub> nanotubes with a high surface area. During the anodization process, the electrochemical conditions such as the applied potential, anodization time and the pH of electrolyte have a large influence on the resulting tube length and morphology. Coupling TiO<sub>2</sub> with other species (elements or oxides) has received much attention for improving photo or electro-related characteristics of TiO<sub>2</sub>. Doping atomic species (carbon, nitrogen, phosphorus, fluoride, sulfur) into TiO<sub>2</sub> layers has been carried out in order to use effectively visible light, because TiO<sub>2</sub> has large bandgap of 3.0–3.2 eV, only absorbing UV light. The addition of metal oxide to TiO<sub>2</sub> has been also observed to improve the photo- or photoelectrocatalytic activities. It has been reported that efficient charge separation occurred when TiO<sub>2</sub> was combined with semiconductor metal oxides. Also, enhanced photocatalytic properties were shown in mixed oxide due to the increased surface acidity. In the present work at alloys, we report various formation of modified TiO<sub>2</sub> based nanotube arrays by electrochemical anodization. The surface morphology

and properties of the tubes can be controlled by selecting the alloying element. Strongly enhanced photoelectrochemical properties of the nanotubes can be achieved.

**Poster 18**  
**A Numerical Study on an Optimum Design of a Cross-flow Power Turbine (CPT)**

Chul-Ho Kim<sup>1</sup>, Jin-Ho Kim<sup>2</sup>

<sup>1</sup>Seoul National University of Technology, Department of Automotive Engineering, Seoul, Korea <sup>2</sup>Graduate School of Energy Environmental Engineering, Seoul National University of Technology, Seoul, Korea

A Wind turbine is one of the most popular energy conversion systems to generate electricity from the natural renewable energy source. An axial-flow type wind turbines have been most commonly used for electricity generation in the wind farms nowadays. In this research, a cross-flow type wind turbine has been studied for the application to a moving vehicle for electricity generation. The target capacity of the electric power generation of the model turbine developed in this project is 12volts-150A·H (about 1.8kW). The important design parameters of the model turbine are inlet and exit angle of the turbine blade, number of blade, hub/tip ratio and exit flow angle of the housing. 2-dimensional Radial Equilibrium Theorem was incorporated to decide the impeller blade angle and CFD technique was used to have the performance analysis of the model power turbine for the optimum design of Cross-flow Power Turbine (CPT). In numerical simulation, Navier-Stokes equations were solved with the SIMPLEC method in a Cartesian coordinate system. Realizable k-ε turbulent model with MARS scheme was used for the evaluation of the energy losses in the turbine flow path. From the result, it was found that the performance of the designed CPT (1:8 scale model) with 24 impeller blades at the inlet and exit angle ( $\alpha=40^\circ$ ,  $\beta=85^\circ$ ) was estimated to have 1.2Nm of the indicated torque and 200watts of the indicated power. On the basis of the similarity law, the indicated power of the full size CPT that is eight times longer than the model CPT is predicted to have a 1.6 kW of the output power (about 12V-130A·H or 24V-65A·H).

**Poster 19**  
**Development of Microbial Fuel Cells (MFCs) for Sustainable Wastewater Treatment and Energy Recovery**

Jung Rae Kim<sup>1</sup>, Giuliano C. Premier<sup>1</sup>, Freda R. Hawkes<sup>2</sup>

<sup>1</sup>Sustainable Environment Research Centre (SERC), 1Faculty of Advanced Technology, and <sup>2</sup>Faculty of Health, Sport and Science, University of Glamorgan, Pontypridd, Mid-Glamorgan, CF37 1DL, UK

Microbial fuel cells (MFCs) are an emerging technology which converts various organic matters to electricity using a biofilm on the electrode as the biocatalyst [1,2]. It has recently been shown that MFCs can be used to treat domestic or industrial organic wastewater. Biologically assisted electrochemical reactions in MFC accelerate organic and nutrient removal in wastewater and simultaneously produce electricity. Swine wastewater treatment was investigated in MFCs producing

electricity specifically for ammonia and odor removal. Ammonia was removed from the anode chamber by electricity generation and charge transfer by redox reactions in the MFC [3]. It was also found that the removal of odorous chemicals was enhanced by electricity production compared to an open circuit control reactor [4], which does not generate electricity. Volatile organic acid biodegradation was accelerated when bacteria could transfer electrons, thereby decreasing acetate accumulation. Feasible reactor designs and development which consider scale-up are required for practical application of MFCs to wastewater treatment. A Tubular MFC reactor module employing membrane electrode assembly (MEA) cathode was considered in terms of continuous operation and scale up. Microbial community development and population dynamics are investigated using serially connected longitudinal tubular MFC reactors with rolled carbon veil anode electrodes. This study might be a foundation from which to develop an MFC using complex substrate and eventually delivering efficient wastewater treatment and energy recovering technology.

**Poster 20**  
**Atomistic Modeling on B Diffusion in Strained Si<sub>1-x</sub>Ge<sub>x</sub>**

Chihak Ahn

School of Electrical, Electronic and Computer Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, UK

There is great interest in utilizing Si<sub>1-x</sub>Ge<sub>x</sub> for future Si devices to enhance carrier mobility and concentration, and reduce contact resistance, and many authors have shown that boron diffusion is retarded in strained Si<sub>1-x</sub>Ge<sub>x</sub> [1-4]. However, the physical mechanism is not well understood and theoretical explanations are still controversial and even contradictory. In order to control device structures at the nanoscale, a fundamental understanding of the effects of alloy concentrations and associated strains is critical.

We investigated the B diffusion mechanism in strained Si<sub>1-x</sub>Ge<sub>x</sub> to solve the controversy, considering both global strain compensation and local Ge configuration. Using an extensive series of first principles calculations, we have developed general models for the change in energy of boron migration state via interstitial mechanism as a function of local alloy configuration. The model is based on consideration of global strain compensation as well as local effects due to nearby arrangement of Ge atoms. We took a statistical average over many alloy configurations based on the change in migration energy to explain the reduced B diffusion in strained SiGe and compared our results to experimental observations. These models include significant effects due to both global stress and local Ge effects, and accurately predict the B diffusivity measured experimentally in strained Si<sub>1-x</sub>Ge<sub>x</sub> on Si as a function of Ge content.

**Poster 21**  
**Marine Vector Magnetic Measurements: Methodology and Examples**

Choi Yujin & Dyment Jérôme

Institut de Physique du Globe de Paris, CNRS UMR 7154, Paris, France

Marine magnetic anomalies are an essential tool to decipher the structure and the age of ocean basins. Usually a scalar (proton precession) magnetometer is towed several hundred meters behind the ship in order to prevent measuring the magnetic effect of the ship and access the magnetic fields caused by the Earth's core (the main field) and crust (the anomalies). This method, however, provides only the intensity of the geomagnetic field, and not the whole description of this vector. Such a description is very useful to estimate the lineated (2D) or more complex (3D) character of the magnetized source body at the origin of the anomalies and, in case of a 2D body, its direction. Such information is of dramatic importance, considering than the magnetic isochrons that sign the past opening of oceanic basins at spreading centres are lineated bodies, whereas isolated volcanic seamounts will present a 3D magnetic signature.

Towed instruments cannot easily be equipped with a stabilized platform and an attitude sensor because one does not want to risk loosing such expensive devices by installing them on a towed instrument. An alternative view is to install the magnetometer onboard and design methods to estimate and correct the magnetic effect of the vessel and the ship motion as well. We follow the methodology proposed by Isezaki (Geophysics, 1988) and have the ship make specific figures at locations with no local magnetic variations in order to measure the field (main field, anomaly and ship fields) along all possible heading directions. Such figures are either "figures eight" (easy to carried out for all ships, but taking about 1 hour each) or revolutions (only for ships equipped with bow thrusters, taking about 10 minutes each). The main field and anomaly are supposed to be constant (in geographic coordinates) and approximated by the IGRF (International Geomagnetic reference Field) model for the corresponding time. So the magnetic effect of the ship can be inverted from the data acquired on such figures, knowing that this effect is made of two contributions: a remanent field, which is a vector attached to the ship body (and therefore constant in ship coordinates) and an induced field which varies with the relative orientation of the ship and the inducing field (i.e. the Earth's main field). The remanent field is expressed as a vector (3 coefficients) and the induced field as a tensor (9 coefficients), so the whole ship's effect is defined by 12 coefficients which are easily determined by a least-square approach. Once this is completed, it is quite easy to correct the whole magnetic data using these 12 coefficients.

The method has been applied to data acquired onboard the new French oceanographic vessel, R/V Pourquoi pas?, on which a shipboard vector magnetometer has been installed. Several technical difficulties have been recognized and are currently being addressed to properly reduce the data and use them for geophysical interpretation. Similarly, vector magnetometers have been installed and successfully used on deep-sea submersible Nautile and remotely operated vehicle (ROV) Victor. The processing scheme has been adapted to correct an additional effect which affects significantly the magnetic effect of Nautile, i.e. variations of magnetization with increasing pressure (and therefore increasing depth of the submersible). The method has been applied to study detailed variations

of the magnetic field intensity used to date the seafloor with unprecedented high resolution (Nautilus cruise) and to depict the magnetic signature of hydrothermal sites and understand the chemical reactor they represent (Victor cruises).

#### Poster 22

#### Constrained Sintering for Planar SOFC

Jung-Sik Kim, Robert A. Rudkin, Alan Atkinson

Department of Materials Royal School of Mines Building  
Imperial College London Exhibition Road  
London SW7 2AZ, UK

Layers of planar type Solid Oxide Fuel Cells (SOFCs) can be fabricated by screen printing on a rigid substrate followed by sintering. Since layers are constrained on a substrate, all densification occurs in the thickness direction. This effect causes retardation of densification kinetics and may induce processing defects. To compare and understand constrained sintering behaviour of electrolyte layer, free-standing film and constrained film were sintered and densification behaviour was observed. In-situ measurement methods are involved to observe densification changes. Long-distance microscopic analysis was used to measure the free-standing film shrinkage profile while customer build laser dilatometer was utilized to measure that of constrained film. 3YSZ (3wt.% Yttria-Stabilized Zirconia) used both for film layer and rigid substrate. Approximately 80 µm thick film was made by tape casting to fabricate free-standing film and screen printing of 3YSZ slurry on dense 3YSZ substrate to prepare constrained film, hence the mismatch of different thermal expansion during sintering of constrained-films was eliminated in this study. The free-standing film was obtained by peeling off portions of the films from the flexible substrate. Constrained film for sintering kinetic measurement was fabricated by screen-printing on a 300µm thick 3YSZ substrate and then cut into 5 mm × 5 mm squares. Both types of samples were heated to 500°C for 2hr to burn binder out. Sintering processes were then done in a furnace at 1350°C with 1hr dwell time. A stack of constrained films was sintered in a dilatometer to measure constrained densification rate. The densification rates were much lower in the constrained films than those in the free-standing films. The effect of the constraint of the support is equivalent to reducing the effective sintering temperature by approximately 200°C. Moreover, sintered density of constrained film was not as high as that of free-standing film. This paper will presents the detailed investigation of these differences. Improved understanding of electrolyte processing was necessary in order to formulate strategies for producing leak-free SOFC.

#### Poster 23

#### Optical Nano Gratings as Biosensors in Lab-on-a-Chip Systems

Young-Hyun Jin<sup>1,2</sup>, Guillaume Suárez<sup>3</sup>, Yves Leterrier<sup>1</sup>, Guy Voirin<sup>3</sup>, Jean-Marc Diserens<sup>4</sup>, Young-Ho Cho<sup>2</sup> and Jan-Anders E. Månsen<sup>1</sup>

<sup>1</sup>Laboratoire de Technologie des Composites et Polymères (LTC), Ecole Polytechnique Fédérale de Lausanne (EPFL), CH-1015 Lausanne, SWITZERLAND <sup>2</sup>Digital Nanocomotion Center and Nanosentuating Systems Laboratory, Korea Advanced Institute of Science and Technology (KAIST),

KOREA <sup>3</sup>Swiss Center for Electronics and Microtechnology Inc (CSEM SA), SWITZERLAND <sup>4</sup>Nestlé Research Center, SWITZERLAND

This paper presents optical biosensors using nano-scale gratings for lab-on-a-chip applications. A lab-on-a-chip (LOC) system is a credit-card sized device that integrates laboratory functions such as mixing, separation and detection on a single chip. For the detection of biomolecules in LOC, optical sensing principles are widely used due to their high sensitivity. Gratings are good candidates as optical transducers can be integrated in LOC systems. In this paper, we reports two recent results of nano-scale gratings for biomolecule detection in LOC systems. The first example is a disposable nano-grating surface plasmon resonance (SPR) sensor [1]. A gold-coated 833 nm pitch grating is encapsulated in the microfluidic channels. The reflectivity of the gratings depends on their surface property, thus, we can detect the biomolecules attached on the surface by observing the reflectivity. The nano-grating chips were fabricated by micromolding process, achieving a compact and inexpensive SPR sensor for LOC systems. Moreover, simultaneous multi-channels detection is carried out by adding an external mirror. We successfully measured the binding reaction rate for the 2 nM ~ 200 nM m-antibiotin, and verified biomolecule concentration detectability. The second example is a LOC system developed for the detection of multiple residual antibiotics in fresh milk. The optical sensor in this LOC system is based on nano-grating using wavelength interrogated optical sensing (WIOS) principle [2]. The grating is used to monitor the refractive index changes in the surface of the sensing area. Glass nano-gratings are integrated in the polymer microchannels made by UV micromolding of hyperbranched polymer (HBP) [3]. The sensor demonstrates successful simultaneous qualitative detection of sulfonamides, fluoroquinolones, b-lactams and tetracyclines in fresh milk. At the conference, the technical details as well as the outlook will be presented.

#### Poster 24

#### The Fawn Trough Current across the Kerguelen Plateau: a bottleneck for the Antarctic Circumpolar flow

Fabien Roquet and Young-Hyang Park

LOCEAN/DMPA, Muséum National d'Histoire Naturelle, Paris, France

Due to its great meridional extent and relatively shallow depths, the Kerguelen Plateau constitutes a major barrier to the eastward flowing Antarctic Circumpolar Current in the Indian sector of the Southern Ocean. While most of the Antarctic Circumpolar Current transport (~100 x 10<sup>6</sup> m<sup>3</sup> s<sup>-1</sup>) is deflected north of the Kerguelen Islands, the remainder (~50 x 10<sup>6</sup> m<sup>3</sup> s<sup>-1</sup>) must pass south of the islands, most probably through the Fawn Trough (56°S, 77°E, 2650m) and Princess Elizabeth Trough (64°S, 82°E, 3650 m).

The analysis of finely-resolved hydrographic data collected by instrumented elephant seals together with satellite and in situ datasets revealed the presence of a strong topographically controlled northeastward current through the Fawn Trough, the so-called Fawn Trough Current. The Fawn Trough appears to act as a veritable bottleneck, channelling the quasi-totality of the cold Antarctic Surface Water found south of the Ice Limit (58°S) and the

Circumpolar Deep Water transiting the Enderby Basin toward the Australian-Antarctic Basin. The Kerguelen Plateau also allows the formation of concentrated meridional flows such as the Deep Western Boundary Current (DWBC) flowing northward along the eastern escarpment of the southern Kerguelen Plateau. The area just downstream of the Fawn Trough in the Australian-Antarctic Basin should be of great dynamic importance as waters of different origins collide and mix.

The analysis of an interannual simulation performed with the global eddy-permitting ( $1/4^\circ$ ) ocean/sea-ice

model NEMO confirmed the presence of the strong Fawn Trough Current. The DWBC is also detected, albeit much weaker than in observations. However, a major discrepancy of the model is the quasi-inexistence of waters originating from the Antarctic slope current of the Australian-Antarctic Basin, implying the inexistence of the Australian-Antarctic subpolar gyre, in opposition to recent observational studies. An improvement of the model especially in vertical mixing parameterization via internal tidal energy dissipation is actually in progress.

## **Society & Business Meeting**

### **International Organizing Committee Meeting**

10:00 – 12:00 August 28<sup>th</sup>, 2008 at Mark Twain

### **Presidents and Attache Meeting**

14:00 – 19:00 August 28<sup>th</sup>, 2008 at Mark Twain

### **Ultra Program**

#### Workshop: Energy

08:00 – 09:40 August 29<sup>th</sup>, 2008 at Hannah Arendt

#### Workshop: Biotechnology

14:30 – 15:30 August 29<sup>th</sup>, 2008 at Hannah Arendt

### **World Class University**

19:10 – 19:30 August 30<sup>th</sup>, 2008 at Friedrich Hegel

### **Networking Bar**

#### Environmental Technology Forum

21:00 – 22:00 August 29<sup>th</sup>, 2008 at Franz Kafka

#### Women in Science and Engineering Forum

21:00 – 22:00 August 30<sup>th</sup>, 2008 at Franz Kafka

# Social Program

## Welcome Reception

19:00 – 21:00 August 28<sup>th</sup>, 2008 at Friedrich Hegel

Welcoming Remarks  
Cocktail Party

## Opening Ceremony

10:00 – 10:40 August 29<sup>th</sup>, 2008 at Friedrich Hegel

Welcoming Remarks  
35<sup>th</sup> Anniversary of VeKNI  
Recognition of Sponsors

## LG Conference Banquet

19:00 – 21:00 August 29<sup>th</sup>, 2008 at Friedrich Hegel

Welcoming Remarks  
LGE Keynote Speech "Challenges and Opportunities in the Consumer" by Sungsu Han  
General Introduction for Principals of the French Wines by Kwangbo SHIM  
Lottery  
Dinner

## Samsung Conference Banquet

19:00 – 21:00 August 30<sup>th</sup>, 2008 at Friedrich Hegel

Welcoming Remarks  
Korea Science and Engineering Foundation (KOSEF): World Class University  
Samsung Presentation  
Best Paper / Graduate Student Best Paper Awards  
Dinner

## VeKNI Classical Music Event

21:00 – 22:00 August 30<sup>th</sup>, 2008 at Friedrich Hegel

### Music Program

"Le quattro stagioni" by A.Vivaldi

-- Les Musiennes

"Danny Boy" from folksong of Ireland

"Pokare kare ana" from folksong of Newzealand "Maori"

"Una furtiva lagrima" by G.Donizetti

-- Jung, Jaehoon  
(Ten.)

"Dein ist mein ganzes Herz" by F. Lehar

"Tonight" by L.Bernstein from West Side Story

-- Les Musiennes

"Shenandoah" from folksong of USA

"Delilah" by Tom Jones

"Ein Maedchen oder Weibchen" from Zauberfloete by W.A. Mozart  
"Ching-a-Ring Chaw" by Aaron Copland

-- Choi, Yong Ho  
(Bar.)

"우리는 / 만남" Arr. by Dongsu Shin

-- Les Musiennes

"널니리맘보" by Hwarang Na

"Hot Hallelujah" (G.F.Handel) Arr. by D.Coombes

"Clap yo hands" by Jihun Park

## Les Musiennes



### Soprano

#### Won, Young Soon

Graduated from Sang Myung University  
Graduated from Italy Frosinone Conservatory of Music  
Graduated from Italy Pescara Academy  
Former Professor of Suwon Woman's Collage  
Leader of Les Musiennes

### Soprano

#### Lee, Young Suk

Graduated from Sang Myung University  
Graduated from Italy Pescara Academy  
Graduated from Italy Roma Santa Cecilia Conservatory of Music  
Lecturer of Sang Myung University

### Soprano

#### Mun, In Suk

Graduated from Sung Shin Woman's University  
Graduated from Italy Salerno Conservatory of Music  
Graduated from Italy AIDM, La Romania Academy

### Soprano

#### Son, Hee Jeong

Graduated from Suk Myung Woman's University  
Graduated from Italy Verona Conservatory of Music  
Master from Austria Mozarteum University of Music  
Lecturer of Suk Myung Woman's University

### Soprano

#### Son, Sung Hi

Graduated from Sung Shin Woman's University  
Master from Korea National University of Art  
Master from University of Music Cologne  
Lecturer of Sung Shin Woman's University

### Soprano

#### Lee, Hyun Seoung

Graduated from Sung Shin Woman's University  
Graduated from Italy Fermo Conservatory of Music  
Graduated from Italy Milan Academy  
Lecturer of Sung Shin Woman's University

### Pianist

#### Jeon, Se Eun

Master of Piano from Sung Shin Woman's University  
Graduated from France Evry Conservatory of Music  
Graduated from France Versailles Conservatory of Music  
Lecturer of Sung Shin Woman's University

## With



### Tenor

#### Jung, Jaehoon

Graduated from Conservatorium Maastricht  
Opera Choir Member at Theater Maastricht and Theater Aachen  
Present... Theater Bonn Opera Choir Member



### bariton

#### Choi, Yong Ho

Graduated from Korea National University of Art  
Graduated from University of Music LUEBECK  
From 2004~ Present ... Theater Luebeck Opera Choir Member

# Excursions

## General Information about Heidelberg

Heidelberg was included in the preliminary German list for registration as a UNESCO World Heritage site and is known for the oldest university in Germany, which is established in 1386. Modern Heidelberg attracts people with its forward-looking science and research activities and is a quickly growing business location and the lively centre of the Rhine Neckar Triangle. Open-mindedness and internationality characterize the city on the Neckar that has cultivated town twinning relationships all over the world.

Population	- 139,941
Time	- German time is GMT + 1 hour.
Money	- Euro (€)
Area	- 109 km <sup>2</sup>
Language	- German
Tourist office	- Main train station (Hauptbahnhof) : opens from 10:00 until 19:00 from Monday to Saturday and from 10:00 until 18:00 on Sunday.
Shopping and banking	- from 10:00 until 20:00 from Monday to Friday and from 10:00 until 16:00 on Saturday.
Bank	- from 08:00 until 16:00, from Monday to Friday. Some banks close for lunch.

## Top sights in and/or near Heidelberg

### Heidelberg Castle

The Heidelberg Castle (in German language named: *Heidelberger Schloss*) is a famous ruin in Germany and landmark of Heidelberg. The castle ruins are among the most important Renaissance structures north of the Alps. The castle has only been partially rebuilt since its demolition in the 17th & 18th centuries. It is located 80 m (262 ft) up the northern part of the Königstuhl hillside, and thereby dominates the view of the old downtown.

### Heidelberg's funicular railway

489 meters long and with a 43 per cent gradient at its steepest point, the lower funicular railway line from Kornmarkt to Molkenkur via the castle was officially opened in 1890. The two split-level cars each carry 50 persons and travel at a speed of around four meters per second.

### The River Neckar

The Neckar is a 367 km long river, mainly flowing through the southwestern state of Baden-Württemberg, but also a short section through Hesse in Germany, a major right tributary of the River Rhine, which it joins at Mannheim. The name *Neckar* was derived via *Nicarus* und *Neccarus* from Celtic *Nikros*, meaning *wild water* or *wild fellow*. Since about 1100, Black Forest wood was transported by timber rafting, e.g. to Holland for the use in shipyards.

### Rotenburg

In the Middle Ages, when Frankfurt and Munich were just wide spots in the road, Rothenburg was Germany's second-largest city, with a whopping population of 6,000. Today it's Europe's most exciting medieval town, enjoying tremendous tourist popularity. For the best view of the town and surrounding countryside, climb the Town Hall tower. For more views, walk the wall that surrounds the old town. Rothenburg's fascinating Medieval Crime and Punishment Museum is full of legal bits and diabolical pieces, instruments of punishment and torture, and even an iron cage — complete with a metal nag gag. Some react with horror, others wish for a gift shop. To hear the birds and smell the cows, take a walk through the Tauber Valley. The trail leads downhill from Rothenburg's idyllic castle gardens to a cute, skinny, 600-year-old Toppler Castle, the summer home of the town's mayor in the 15th-century. While called a castle, the floor plan is more like a fortified tree house. It's intimately furnished and well worth a look.

### Loreley

First traces of human settlement have been apparent from the time the Loreley Plateau was level with the Rhine (600,000 years ago). During the Middle Ages the Loreley was well known, along with the Binger Loch, as the most dangerous section of the Rhine. Many mariners in their wooden dinghies came to tragedy here. In St. Goar, directly opposite the Loreley, the Saint Goar settled to

save shipwrecked mariners and nurse them back to health. The Loreley is a 132 m (433 feet) high slate cliff in the Upper Middle Rhine Valley World Heritage near the town of St. Goarshausen. The view of St. Goarshausen, from the Loreley outlook point, with Castle Katz and the view of the town St. Goar and its Fortress Rheinfels, leaves a wonderful impression on all Loreley tourist.

### Ruedesheim

Ruedesheim is the entrance to the Upper Middle Rhine Valley. Nature and history have left a rich heritage here in the wine-growing Rheingau region whose origins date back to pre-Roman times. The inescapable romanticism of the Rhine, the historic palaces and ancient castles, excellent Riesling and pinot noir wines, together with Ruedesheim's famous hospitality and conviviality give the town a very distinctive atmosphere. Ruedesheim has many attractions, such as the Drosselgasse lined with wine taverns and gardens and the Niederwald monument, depicting the mythical figure of Germania, which can be reached from Ruedesheim and Assmannshausen by foot through the vineyards, or by cable car or chair lift. The ruins of Ehrenfels Castle are in an idyllic location surrounded by vineyards above the Rhine gorge.

### Family Tour

#### August 29, 2008 (**Rothenbrug**)

- 09:00 Departure time to Rothenburg
- 12:00 Lunch in Rothenburg
- 13:00 Sight seeing in the town (the Middle Age street)  
Visiting Kriminal Museum (payment – private)
- 14:00 Departure time to Heidelberg
- 16:00 Expected arrival time
- 18:30 Dinner in Marriott Hotel

#### August 30, 2008 (**Loreley/Ruedesheim**)

- 09:00 Departure time to Loreley
- 11:30 Sight seeing on the heel of Loreley
- 12:00 Lunch
- 14:30 St Goashausen- Ruedesheim boot tour (ca. 10 Euro)
- 15:30 Ruedesheim sight seeing
- 16:30 Departure time to Heidelberg
- 19:00 Dinner in Marriott Hotel

## EKC2008 Participant List

Name	Institution or Company
Ahn, Chihak	University of Newcastle upon Tyne
Bae, Dong-Woon	Intermundien GmbH
Bae, Sung Eun	
Baek, Je Hyun	Pohang University
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Chang, Keunpack	International Thermonuclear Experimental Reactor
Chang, Doo-Bong	AR&T, Applied Robot & Technologies
Chang, Seung Hyeok	Hyundai Motor Company
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Cho, Ik Hwan	University of Nottingham
Cho, Song-Yean	Ecole polytechnique and INRIA
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Cho, Min-Kyu	Max Planck Institute for Biophysical Chemistry
Cho, Kwangsoo	John Innes Centre
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Chung, Chan Hoon	RWTH Aachen University
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Han, Woo-Suck	ENSMSE
Han, Sungsu	LG Electronics
Han, Hyosun	University jean monnet
Han, Seung Ho	International Plasma Research Center

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Seok, Joon-Weon	VeKNI
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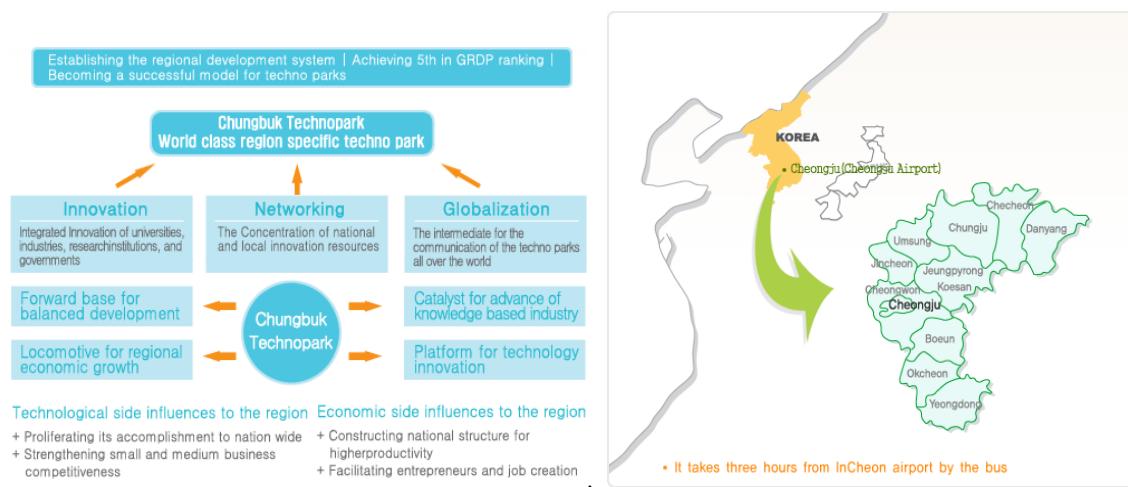


## The introduction of Chungbuk Technopark



Chungbuk Technopark leads the ways of **fostering strategic industries**, **hauling the growth of the local economy**, and **executing balanced regional development** to achieve the self sustainable regional development eventually.

### Vision & Location



### Organization



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- |                            |   |
|----------------------------|---|
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| <b>Projects</b>            | A number of research projects are under way at the University of Michigan, including a study of the impact of the new health care legislation on the elderly, a study of the impact of the new health care legislation on the elderly, and a study of the impact of the new health care legislation on the elderly. |
| <b>Plains</b>              | The University of Michigan's Plains region includes the state of Michigan, Indiana, Ohio, and West Virginia.  |
| <b>Technology Transfer</b> | The University of Michigan's Technology Transfer program is designed to help businesses and organizations develop and commercialize their technologies.   |

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• A technology transfer program between industry and university research groups.

**Research**

• A review of existing R&D projects, and areas of potential interest.

**Projects**

• A technology transfer program between industry and university research groups.

**Partnership**

• A technology transfer program between industry and university research groups.

**5**  
Advanced Center for Electron Beam Processing  
**ACEP**



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# 경기바이오센터

## 위치

서울에서 20km, 30분 거리



## 기능



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- 분야: Cell & Molecular Pharmacology, Medicinal Chemistry, Drug Target 관련 분야 박사학위 또는 신약개발 유경험자
- 연락처: 신상훈 팀장 (shshin@ggbc.or.kr, +82-10-5239-2888)

GYEONGGI BIO-CENTER

# World Class University Project

**The Korean Ministry of Education, Science and Technology  
(MEST) is inviting excellent scholars and researchers  
from around the world to establish new academic projects  
and conduct joint research at Korean universities  
in the field of emerging technologies**

**What is the WCU project?**

The WCU project is a higher education subsidy program of the Korean government, which invites international scholars who possess advanced research capacities to collaborate with Korean faculty members and establish new academic programs in key growth-generating fields.

**Who is eligible for WCU participation (foreign scholars)?**

All faculty members/researchers employed at a university, research institute or enterprise outside Korea are eligible to apply, including scholars of foreign nationality, ethnic Koreans who hold foreign nationality or citizenship, and scholars of Korean nationality.

**Type 2: Recruiting foreign scholars**

**to existing academic projects**

Under this type, foreign scholars are employed as full-time faculty members at existing departments of Korean universities to conduct joint research with Korean academics. Recruited foreign scholars are expected to be capable of developing new growth-generating technologies and also creating interdisciplinary studies.

**Type 3: Inviting distinguished world-class scholars**

The third type invites distinguished scholars (including pioneering high-tech engineers) as part-time faculty members to conduct academic or research activities in a Korean university for a period of at least two months per academic year.

**How does the WCU project work?**

**Type 1: Establishing new academic departments or specialized majors**

Under this type, high-quality foreign scholars are employed at Korean universities as full-time faculty members, on a contract of three

**What does the WCU subsidy cover?**

For types 1 and 2, the Korean government provides a competitive annual salary, research grants, and lab establishment expenses etc for each foreign scholar.

For type 3, the government provides an annual salary for foreign scholars and also provides research grants for joint research projects carried out with Korean scholars.

**Where can applicants find further details?**

Interested scholars are invited to view details and post questions about the WCU project on KOSEF's website:  
**[http://www.kosef.re.kr/english\\_new](http://www.kosef.re.kr/english_new)**

# Floorplan



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