

The 5th Kobe University Brussels European Centre Symposium  
**Innovation, Environment,  
and Globalisation**  
- the Latest EU-Japan Research Collaboration -

Date: 14 October 2014

# Preface

I am pleased to publish this report on the 5th Kobe University Brussels European Centre (KUBEC) Symposium “Innovation, Environment, and Globalisation Latest EU-Japan research collaboration” which was held in Brussels on 14 October 2014. KUBEC has been holding an annual symposium in Brussels since its establishment in 2010. Since then, we have been striving to expand our academic network in Europe and to raise the profile of Kobe University and Japanese universities overall. In this regard, we place an emphasis on our “visibility” in Europe, by holding a number of academic workshops and seminars at KUBEC or at partner institutions as well as the annual symposium in Brussels, which features guest speakers from European institutions as well as Japanese universities.

The theme of the 5th symposium, “Innovation, Environment, and Globalisation” focused on the shared challenges Japanese and EU society face as they pursue future development. The latest research results and applications of bioproduction, membrane technology, natural disasters and water in biological systems were introduced by both Japanese and European researchers in the hope of establishing future collaboration using advanced technology for each project. Furthermore, we also discussed the forefront of Japanese studies in the world as an example of the globalisation of academic society, welcoming prominent researchers from around the world. As a result of this symposium, collaborative projects are under discussion or have already begun, which I hope will enhance EU-Japan research collaboration for the betterment of our societies.

**Hideki Fukuda**

President  
Kobe University

A handwritten signature in black ink, appearing to read "Fukuda Hideki".



# The 5th Kobe University Brussels European Centre Symposium

## Innovation, Environment, and Globalisation

### - the Latest EU-Japan Research Collaboration -

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Organiser: Kobe University  
Co-organiser: JEUPISTE

**Date & Time: 14 October 2014 9:30 - 18:00**

**Venue: Thon Hotel Bristol Stephanie**  
Avenue Louise 91-93 Louizalaan Bruxelles 1050 Brussel

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#### **Opening** 9:30 - 10:00

MC: Prof. Hiroshi Takeda, Executive Vice-President of Kobe University

- 9:30 Opening Address: Dr. Hideki Fukuda, President of Kobe University
- 9:35 Speech: H.E. Mr. Keiichi Katakami, Ambassador of Japan to the European Union
- 9:43 Speech: Dr. Wolfgang Burtscher, Deputy Director-General, DG RTD European Commission
- 9:52 Speech: Dr. Toshiyasu Ichioka, Project Manager, EU-Japan Centre for Industrial Cooperation

#### **Session 1** 10:00 - 13:30

Current Status of Bio-based Chemical Production Technology  
in Japan and Europe

#### **Session 2** 14:30 - 18:00

Towards Further Development of Innovative Membrane Technology

#### **Session 3** 10:00 - 13:30

Climate Change and Water Resources Management

#### **Session 4** 14:30 - 18:00

Aquaphotonics, "Understanding Water in Biological World"

#### **Session 5** 10:00 - 18:00

Forefront Studies on Japanese Culture and Society

# Opening Speech

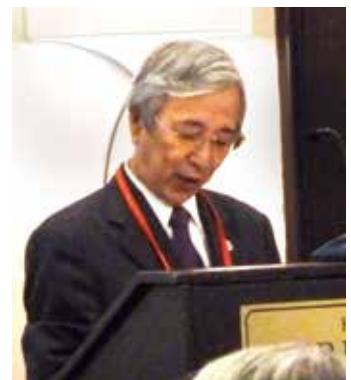
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## Dr. Hideki Fukuda

President of Kobe University

Distinguished guests, ladies and gentlemen, it is a great pleasure for me to welcome you to the 5th Symposium of Kobe University Brussels European Centre.

Today, we have many distinguished guests in attendance, and I would like to express my sincere gratitude in particular to our honorable guests, His Excellency Ambassador Keiichi Katakami, Mission of Japan to the European Union, and Dr. Wolfgang Burtscher, Deputy Director-General, Directorate-General for Research and Innovation, the European Commission, and Dr. Toshiyasu Ichioka, Representative of JEUPISTE. Moreover, today we have prominent researchers in attendance, in particular we are honoured to welcome Professor Luc Montagnier from France, a Nobel Laureate. I am grateful for everyone's participation.



The theme of this symposium, "Innovation, Environment, and Globalisation" uses the major keywords representing the present world. Both Japan and the EU recognise that "Innovation" is critical to the further development of society. As with the EU, "Innovation" is one of the core factors of Japan's Growth Strategy and the role higher education in creating innovation. You will rediscover today how Japanese universities in collaboration with overseas partners are developing and creating state-of-the-art methods and technologies.

As for "Environment", we can and also must share measures to protect the environment and address climate change. I believe and I expect that the contribution of research, here I might say universities, in this field is invaluable.

Finally, "Globalisation", this is no longer a unique phenomena, but common practice to us. This naturally extends to the academic world.

This holds true in the area of natural sciences and even in humanities. You will observe how "Japan", its society and culture, is studied by researchers around the world, which we call forefront studies.

I hope you will discover today the essence of Japanese research eminence, which has resulted in the recent announcement of 3 new Nobel winners in Physics adding to the previous total of 19, and enjoy this symposium as a showcase of the latest Japan-EU research collaboration and as an opportunity to further collaboration or create new cooperation to enhance research abilities so as to better society.

I thank you all again for participating in today's Symposium.

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## H.E. Mr. Keiichi Katakami

Ambassador of Japan to the European Union

Dr Hideki Fukuda,

Dr Wolfgang Burtscher, European Commission,

Distinguished participants,

Ladies and Gentleman.



It's a great honour to be here at the 5th Kobe University Brussels European Centre Symposium.

I would first like to extend my appreciation and congratulate those who have organised this event.

Today's themes of Innovation, Environment, and Globalisation are priorities for Japan. My wish for this symposium is that the combined contributions from academics, students and industry, will give new momentum to Japan-EU collaboration in these fields.

I would first like to touch upon the latest developments in Japan.

As you are aware, Japan has been struggling for 15 years with chronic deflation. We are in the middle of our earnest effort to address this issue.

To this end, the Abe administration has implemented a string of policies called "Abenomics" in quick succession, and it seems these efforts are beginning to bear some fruit.

One of the principle pillars of "Abenomics" is the new growth strategy. Under this pillar, one of the key actions that Prime Minister Abe has stressed is "Actions for innovation."

We need concrete actions to invoke innovation which awakens and taps the huge potential our societies should be able to enjoy.

In one response to this call and following nationwide discussion to reflect the present Japanese and global situation, Japan has created the Comprehensive Strategy on Science, Technology and Innovation Plan.

Today's themes are at the heart of this plan, which also requires all related official bodies in Japan try to promote Science and Technology activities.

This is just a very small example of the actions that Japan is taking at home, under Abeconomics, but this policy also has major external aspects. Looking globally, international cooperation is essential to promote the further development of science and technology in the borderless world. I am particularly glad to see today's topic of globalisation reflect this.

Effective international cooperation requires strong and determined partners. I firmly believe that Japan-EU collaboration in these fields will have a profound and positive impact, and help us to overcome the common challenges we face.

To demonstrate the evident potential in Japan-EU collaboration, I would like to briefly touch up the governmental cooperation that exists in the field of environmental science. Namely;

- Joint research and development of advanced solar cells,
- Joint calls in the field of substitution of critical raw materials,
- Joint efforts in cooperative support of research in the field of energy management.

Greater efforts will be needed to enhance our cooperation in all areas, and we must endeavour to make the Japan-EU relationship stronger than before.

In our joint collaborations we must act with a sense of responsibility.

Japan and the EU have a responsibility to realise a new society, not just for us but for the whole world, which is based on the innovation and scientific knowledge.

Today's symposium marks a golden opportunity for all academic, researchers and innovators of Japan and the EU to come together with new wisdom, to discuss, to enhance cooperation, and to work towards a better world.

From this perspective I am looking forward to results of this symposium.

Thank you.

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## Dr. Wolfgang Burtscher

Deputy Director-General, DG RTD, European Commission



First of all, I would like to thank the organiser of the conference, Kobe University, for giving me the opportunity to present Horizon 2020 and the opportunities for Japanese researchers and research organisations to participate. I would also like to thank the co-organiser of the symposium, the BILAT project JEUPISTE, which through its different activities is an important support in our efforts to strengthening EU-Japan cooperation.

I am very delighted to meet with His Excellency Ambassador Keiichi Katakami for the first time, who is the new Ambassador at Japan's Mission to the European Union, and who I would like to give my warmest welcome to Brussels. I am convinced that we will have a productive relationship.

Let me also take this opportunity to congratulate the Japanese research community for the announcement on Tuesday 7 October of the 2014 Nobel Prize for physics, awarded to a trio of Japanese scientists for the invention of blue light emitting diodes (LEDs). The blue LEDs developed by Professors Isamu Akasaki, Hiroshi Amano and Shuji Nakamura helped produce bright, energy-efficient white light sources.

Now, let me turn to the topic of my intervention – Horizon 2020. The EU's Horizon 2020 programme (2014-2020) is the largest and most open research and innovation funding programme in the world with a budget of nearly 80 billion euro. Horizon 2020 is open to participation of researchers and research institutions from anywhere in the world, to extend the frontiers of scientific knowledge, tackle challenges that affect us all and make industries more competitive.

The focus of this symposium is on innovation, environment and globalisation. These are all key elements of Horizon 2020. Global challenges are important drivers for research and innovation. Our planet has finite resources which need to be cared for sustainably; climate change, environmental problems and infectious diseases do not stop at national borders, and food security is a pressing issue in many regions across the globe. This calls for global responses and are drivers for international cooperation in research and innovation to build critical mass, pool knowledge and identify innovative solutions.

EU-Japan relations have developed steadily over the past two decades. The EU and Japan share many of the same challenges (energy security, access to critical raw materials, ageing populations) and defend a similar approach to key international objectives such as security and combating climate change. Japan is in many ways one of Europe's closest partners on the international stage.

This is why we believe there is a strong potential for strengthened cooperation with Japan in research and innovation. As stated at the last EU-Japan Summit in May 2014, together we aim for a new strategic partnership in research and innovation. We therefore strongly encourage an increased level of participation of Japanese researchers and research organisations in Horizon 2020.

As you may know, Horizon 2020 is fully open to international participation. We target strategic areas of cooperation with our international partner countries and regions, in particular Japan.

We have a cross-cutting approach to international cooperation in Horizon 2020, which means that international cooperation activities permeate all the areas of Horizon 2020: a full 20% of all topics in the first Horizon 2020 Work Programme 2014-15 have been flagged as being specifically relevant for international cooperation. Multi-lateral approaches are also fostered and a number of 'flagship' co-funded initiatives have been identified, such as the EU-Japan cooperation in the area of ICT.

Technically, there are two ways to cooperate with industrialised countries such as Japan in Horizon 2020:

The "*General Opening*" means that any organisation from any country can join a consortium and submit a proposal. We call this also the 'bottom up' approach. The evaluation is based solely on the quality of the proposal submitted by the consortium. So far, there have been 108 participations by 50 different Japanese organisations in 79 FP7 projects.

The Marie Skłodowska-Curie Actions, which support international research careers, networking and mobility of researchers, have since 2007 funded 412 Japanese researchers, and 59 Japanese organisations have participated in the scheme.

In the "*Targeted Opening*" approach, international cooperation with specific countries is either encouraged or required in the proposal. We call this the 'top down' approach.

One way of implementing this targeted opening is through "coordinated calls". The "coordinated calls" are organised jointly with funding organisations from third countries. This has worked well with Japan for five calls in FP7 in the fields of ICT, aeronautics, energy and critical raw materials. In addition, during the first year of Horizon 2020, an additional two coordinated calls will be launched – one in ICT and one in aeronautics. These calls have been launched together with:

- the New and Industrial Technology Development Organisation (NEDO) in new energy technologies;
- the Japan Science and Technology Agency (JST) in new materials and critical raw materials;
- the Ministry of Economy, Trade and Industry (METI) in aeronautics; and
- the Ministry of Internal Affairs and Communication (MIC) in ICT.

I am delighted to see that the organiser of this conference - Kobe University - already has participated in projects in the EU's framework programme in areas such as Nanotechnologies and Nano-sciences and environmental protection; in addition it is a partner in the FP7 JEUPISTE project, which is the co-organiser of this conference.

To give you a concrete example, Kobe University was recently a partner in the FP7 project "Systemic seismic vulnerability and risk analysis for buildings, lifeline networks and infrastructures safety gain" (SYNER-G), conducted together with partners in Europe and the US, which was concluded last year.

In conclusion, Horizon 2020 is 'Open to the World' – and we would be pleased if more Japanese researchers and research institutions will take the opportunity to join the cooperation for the benefit of us all.

I would like to thank again the organisers for providing me this opportunity to introduce Horizon 2020 and our international cooperation policy to this Symposium.

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## Dr. Toshiyasu Ichioka

Project Manager, EU-Japan Centre for Industrial Cooperation

The FP7 project "Japan-EU Partnership in Innovation, Science and TEchnology (JEUPISTE) is for the promotion of Europe-Japan cooperation in Science, Technology and Innovation (STI). The consortium consisting of 10 partners from across Japan and Europe (including the Institute for International Studies and Training as Coordinator and Kobe University from Japan) is engaged in wide range of promotional activities, such as collection of relevant data and analyses to support STI policy dialogues, organization of information seminars for dissemination and workshops for active partnership building, operation of help desk and organization of training courses. The project started in September 2013 and will run until the end of August 2016.



<http://www.jeupiste.eu>

With a vision that appropriate information and support services are useful and can greatly enhance the level of EU-Japan STI cooperation, the project has established a system for useful and comprehensive services and is extensively addressing the STI communities both in Europe and Japan towards further collaborative projects in the era of open innovation. Cooperation with relevant schemes like National Contact Point (NCP) and the Enterprise Europe Network (EEN), for which both the EU-Japan Centre for Industrial Cooperation is involved, makes the activities organic and effective. Furthermore, the participation of Japanese academia in the JEUPISTE project, namely Kobe University, complements the efforts and active networking among the participants of the symposium was strongly encouraged.

# Session 1

10:00-13:30

## Current Status of Bio-based Chemical Production Technology in Japan and Europe

Chair: Prof. Kenichi Yoshida, Kobe University, Japan

Speakers: Prof. Akihiko Kondo, Kobe University, Japan

Prof. Michihiko Ike, Osaka University, Japan

Prof. Colin Webb, University of Manchester, UK

Prof. Em. Pierre Monsan, Director Cell Ex TWB, France

Prof. Roel Bovenberg, DSM/Groningen University, the Netherlands



We have become more eco-aware to live more sustainably, and thus global trends are driving an increasing demand for bio-based chemical production. The rapid development in biotechnology is one of the most important elements to reduce dependence on petroleum-based products and to encourage transition to a greener way of living. Not only the scientific researches but also the intimate collaboration between academia and industries are required to implement the newly developing technologies to the realistic productions. This session was dedicated to share our knowledge and current status of research and development in bio-based chemical production in Japan and Europe. The two Japanese speakers, Professors Akihiko Kondo (Kobe University) and Michihiko Ike (Osaka University), presented the highlights in their researches going on the Japanese side, especially the former speaker impressed the audience with the emerging progress in the Innovative BioProduction Kobe (iBioK), which is the project supported by the Special Coordination Funds for Promoting Science and Technology, Creation of Innovation Centers for Advanced Interdisciplinary Research Areas, MEXT, Japan. Professors Colin Webb (Manchester University, UK) and Pierre Monsan (Toulouse, France) made the pair of beautiful talks on their achievements and perspectives in European bio-based chemical production. And finally Professor Roel Bovenberg (DSM/ Groningen University, NL) offered us the chance to learn the industrial vision and developing bio-based economy in Europe.

# Prof. Ken-ichi Yoshida Chair

Department of Agrobioscience,  
Graduate School of Agricultural Science, Kobe University, Japan



After a Master obtained at Kyoto University in 1989, he got the position of Assistant professor at Fukuyama University in 1990 and obtained a PhD at Kyoto University in 1993.

After a Post-Doc experience at INRA, France, from 1996 to 97, he moved to Kobe University in 2004 as Associate professor, and was promoted to be Professor of Applied Microbiology in 2009.

He has specialized in functional genomics of bacteria including *Bacillus subtilis* and its relatives since the very beginning of his career to date.

He was once awarded the prize for "Encouragement of Young Scientists" (2002) and twice the prize for "Excellent papers" from the Japan Society for Bioscience, Biotechnology, and Agrochemistry (2008 and 2014).

He served in the Research Promotion Bureau in Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT), as a Program Officer (Scientific Research Senior Specialist) (2005-2007).

Currently he serves as well in Kobe University Brussels European Centre as one of the directors (Executive director, since April 2014).

# Prof. Akihiko Kondo

Director of Biorefinery Center, Kobe University, Japan



A. Kondo obtained his Ph.D. in Chemical Engineering, Kyoto University in 1988. He started his academic career at Department of Applied Chemistry, Kyushu Institute of Technology in Japan as an associate professor. Then he moved to Kobe University in 1995 and he was promoted to a full professor in 2003. He has developed cell surface engineering and synthetic bioengineering as core technology, and promoted extensive research. In 2007, Kobe University established Biorefinery Center headed by A. Kondo as a director, and he is also leading the Biomass Engineering Program at RIKEN as a team leader from 2012. He also launched a big project "Innovative BioProduction Kobe" as vice director, which is supported by MEXT, Japan. From 2010, A. Kondo was appointed as Editor: Journal of Biotechnology, Associate Editor: Biochemical Engineering Journal, Editorial board members: Biotechnology for Biofuels, Bioresource Technology, Journal of Biological Engineering, FEMS Yeast Research. Kondo received several awards, including Iue Memorial Foundation Award (2011), Achievement Award of the Society for Biotechnology Japan (2010), Renewable Energy 2010 Best Paper Award (2010), and Excellent Paper Award of The society for Biotechnology Japan (1999, 2000, 2001).

## ***“Development of microbial cell factories for biorefineries”***

**Abstract:** To build an energy and material secure future, we must pioneer the next generation of renewable fuels and chemicals using environmentally benign production processes. Since biomass represents an abundant carbon-neutral renewable resource for the production of biofuels, numerous environmental and social benefits could result from the replacement of petroleum-based transport fuels with bioethanol converted from biomass. One of the key technologies for the development of biorefineries is cell surface engineering, which is a powerful tool for engineering and functionalizing many organisms. Using the technology, various kinds of functional proteins, such as enzymes, can be expressed on the cell surface without loss of cell activity. The display of amylolytic and cellulolytic enzymes on the surface of *Saccharomyces cerevisiae* has accomplished direct

ethanol production from starchy and cellulosic biomass. Moreover, the display of hemicellulase on the surface of *S. cerevisiae* that has a xylose-assimilating metabolic pathway has enabled production of ethanol from hemicellulosic materials. Furthermore, reutilization of the cell-surface engineered yeast has an advantage in the reduction of enzyme cost, which enables reuse of enzymes on the cell surface by collecting the cells. Thus, cell surface engineering is a promising technology for the development of a consolidated bioprocess by integrating enzyme production, saccharification and fermentation. Regardless of the biomass hydrolysis, metabolic engineering of microorganisms is emphasized for the efficient production of ethanol from biomass.

## Prof. Michihiko Ike

Professor at Graduate School of Engineering (GSE), Osaka University, Japan

Awarded MSc and PhD from GSE in 1987 and 1993, respectively.

After working for Kubota Co., joined Osaka University as an academic member.

The research focuses on technologies concerning conservation of environment and resources using biological means.



### ***"Enhanced production of duckweed biomass using a novel plant growth-promoting bacterium, shinorhizobium sp. SP4"***

**Abstract:** Duckweeds, small floating aquatic plants, have become regarded as an ideal raw material for biorefinery, especially production of liquid fuels. Because they don't compete with food crops for arable land, don't need fertilizer and irrigation when cultivated with wastewater or in eutrophicated water bodies, can be cultivated worldwide and easily harvested, and are relatively rich in starch though the lignin content is low. To further improve the value of duckweeds, we have isolated a novel plant growth-promoting bacterium (PGPB), Sinorhizobium sp. SP4, and its ability to enhance the biomass production of a duckweed, Spirodela

polyrhiza, was evaluated. Co-cultivation with SP4 for a day enhanced the photosynthesis activity of S. polyrhiza 1.9 times, and resultantly increased the biomass production 2.3 times during 5-day cultivation in a synthetic medium, when compared with that of untreated duckweed. Similar effects were observed for other two duckweeds, Lemna minor and Wolffia arrhiza. The enhanced biomass production of S. polyrhiza was also demonstrated in the cultivation in a non-sterile secondary effluent from a real sewage treatment plant. In this experiment, very efficient removal of nitrogen and phosphorous from the effluent was also indicated as a by-product.

## Prof. Colin Webb

Professor of Chemical Engineering, University of Manchester, UK

Colin Webb is Professor of Chemical Engineering at the University of Manchester and currently Vice-President of Institution of Chemical Engineers (IChemE).

He is also Editor-in-chief of The Biochemical Engineering Journal.

Colin's research has always been at the interface between biotechnology and chemical engineering and nowadays is largely directed towards the sustainable bioconversion of agricultural raw materials and the development of integrated biorefinery systems.



### ***"Bio-based industrial chemicals from biorefinery wastes"***

**Abstract:** It is almost 100 years since, at the University of Manchester, Chaim Weizmann laboured in his laboratory to perfect the acetone-butanol-ethanol fermentation as the first example of large scale Industrial Biotechnology. We now look to Industrial Biotechnology to supply a wealth of different products and it is technically feasible to produce the full range of functional molecules required to meet our chemical, fuel and material needs. The 'biorefinery' now exists as a concept, set to challenge the dominance of the petro-refinery in supplying our everyday needs from feedstocks that we can rely on being available well beyond the limited supplies of petroleum. Our challenge is to 'engineer' these biorefinery processes to compete economically and key to the successful achievement of this will be the development of integrated systems in which waste streams are transformed into value-added products.

Much interest has been shown recently in the biological conversion of glycerol, a by-product of the biodiesel process, into commodity chemicals, which can be used as building blocks for a variety of value-added products. We have combined this strategy with the

production of rich fermentation feedstocks from biofuel processing by-products, such as rapeseed residues, to produce a range of bio-based products including succinic acid, PHB and microbial oil. The inhibitive effects of crude glycerol impurities have also been studied and the whole system has been modelled to enhance design predictions.



# Prof. Em. Pierre Monsan

Director Cell Ex TWB, France

Pierre F. MONSAN is Professor at Mines ParisTech and Professor Emeritus of INSA, University of Toulouse. He heads the preindustrial demonstrator "Toulouse White Biotechnology", with a consortium of 20 industrial and 4 financial partners. He is member of the French Academy of Technology and of the ExBo of the EFB.



## "Toulouse White Biotechnology": a public/private consortium

**Abstract:** Toulouse White Biotechnology (TWB) is a pre-industrial demonstrator in the field of Industrial Biotechnology, which was granted €20M in 2011 by the French National Research Agency (ANR) within the frame of the "Health & Biotechnology" call of the "Investment for the Future" National Program. It is aimed at accelerating the transfer of the scientific results from academic research groups, particularly the Laboratory of BioSystems and Chemical Engineering of INSA (350 researchers). TWB is based on a public/private consortium gathering 20 industrial and 4 financial partners. Current

projects are in the fields of biofuels, biomaterials, biopolymers, and industrial chemical synthons. TWB offers research and development contracts to private companies from research to pilot scale (metabolic pathway design, strain optimization, process optimization and scale-up). Each project is not only assessed from a scientific and technological, but also from a sustainable development and ethical point of view, in collaboration with philosophers and sociologists from the Higher School of Ethics of Sciences of Toulouse.

# Prof. Roel Bovenberg

DSM/Groningen University, the Netherlands

Roel Bovenberg (PhD) is Corporate Scientist Biotechnology at the Life Sciences and Material Sciences company DSM.

He is affiliated to the DSM Biotechnology Center, Delft (NL) and honorary professor of Synthetic Biology and Cell Engineering at the University of Groningen (NL).

He studied chemistry at the University of Leiden with a focus on biochemistry and genetics followed by a PhD at the University of Utrecht on molecular biology of human gene expression. After his PhD in 1988 he joined the industrial biotech company Gist-brocades (Delft, since 1998 part of DSM) and started to research the genetic-and metabolic pathway engineering of filamentous fungi for the production of antibiotics.

Since then he has been involved in a broad range of metabolic engineering and screening projects.

He coauthored >60 peer reviewed papers and patents in this field. In 2007 he was appointed as honorary professor at the University of Groningen starting new initiatives in Synthetic Biology. He is co-founder of the Center for Synthetic Biology and the iGEM student competition at the University of Groningen, of (inter) national programs on discovery of natural products like antibiotics and sustainable production methods for biochemicals, participant and chair of industrial platforms in EU Framework programs, chairman of the scientific advisory board of the Kluyver Center of Genomics of Industrial Fermentation (NL), member of the international scientific advisory boards of Metabolic Engineering (IMES) and Genetics of Industrial Microorganisms (GIM) conferences, member of the industrial advisory board of the Synthetic Biology Engineering Research Center (SynBERC) and member of the World Council on Industrial Biotechnology.

He has a special interest in microbial screening technology, exploration of Fungal and Actinomycetes genomes for novel bioactive compounds, engineering of enzymes and microbial cell factories for sustainable production of antibiotics and other (bio)chemicals.



## "Industry vision on Biobased Economy"

**Abstract:** The presentation aims to give some insight into industrial efforts to develop a biobased economy. The establishment and role of both public-private as well as private partnerships will be

discussed. Selected examples will be used to illustrate and highlight the importance of required competences, both technical and societal, to develop a sustainable biobased economy.



# Session 2

14:30-18:00

## Towards Further Development of Innovative Membrane Technology

Chair: Prof. Hideto Matsuyama, Kobe University, Japan

Speakers: Prof. Koji Kuraoka, Kobe University, Japan

Prof. Toshinori Tsuru, Hiroshima University, Japan

Prof. Bart Van der Bruggen, KU Leuven, Belgium

Prof. Ivo Vankelecom, KU Leuven, Belgium

Prof. Nieck Benes, University of Twente, the Netherlands



Membrane technology is now growing and applied to various fields such as water treatment, gas environmental protection, electronic device, medical use and so on.

In this session, three speakers each from Japan and Europe presented their latest research results and applications of membrane technology.

Professor Hideto Matsuyama introduced Center for Membrane and Film Technology (MAFTech Center) which he established as the first membrane center in Japan. In addition to extensive research by 5 research groups at MAFTech Center, collaboration with industry is initiated by Research Organization for Membrane and Film Technology holding the members of 60 companies.

Following his introduction, 5 professors introduced the latest technologies: Professor Koji Kuraoka presented silica/poly (vinyl alcohol) organic-inorganic hybrid gas barrier films via the so-gel method by microwave irradiation and layered double hydroxide/poly (methyl methacrylate) organic-inorganic hybrid gas barrier films. Professor Toshinori Tsuru proposed a new strategy to control pore sizes of silica membranes using bridged alkoxides.3-8) Bis (triethoxysilyl) ethane (BTESE), consisting of ethane group between 2 silicon atoms (-Si-CH<sub>2</sub>-CH<sub>2</sub>-Si-) as the minimum unit in hydrolysis and condensation reaction. Professor Bart Van der Bruggen introduced advanced application of electrodialysis. Professor Ivo Vankelecom presented solvent resistant nanofiltration (SRNF) as well as a new concept of biocatalytic membrane reactor. Finally, Professor Nieck E. Benes explained the synthesis of hyper-cross-linked ultrathin membranes. After those presentations, all members discussed those novel technologies and their applications, and explored the possible collaboration among those projects.

# Prof. Hideto Matsuyama Chair

Center for Membrane and Film Technology  
Department of Chemical Science and Engineering,  
Kobe University, Japan



Prof. Matsuyama has been working on membrane research for over 20 years.

He received B.A.Sc., M.A.Sc. and honors PhD title from Kyoto University.

In 2004 he became full professor in Kobe University.

Since 2007, he has been the director of the Center for Membrane and Film Technology which is the first and only one membrane center in Japan.

## ***“Cutting edge of center for membrane and film technology in kobe university”***

**Abstract:** We established Center for Membrane and Film Technology (MAFTech Center) in Kobe University on April 2007. This is the first membrane center in Japan. The membrane technology is now growing and applied to various fields such as water treatment, gas environmental protection, electronic device, medical use and so on. Especially, water purification by the membrane has been attracting much attention due to the worldwide water shortage. The CO<sub>2</sub> membrane separation is also the hot topic with respect to the protection of global warming.

The MAFTech Center in Kobe University consists of 15 faculty members and more than 110 students. The center consists of 5 groups such as Water Treatment group, Gas Separation/Gas Barrier group, Film Coating group, Organic Thin Film group and Membrane Bioprocess group.

One of the main research topics of MAFTech Center is water treatment by membrane filtrations. Serious problems occurred in the membrane water treatment is membrane fouling, which is usually induced by deposition or adsorption of impurities on membranes. Our Center focused on the comprehensive researches on the membrane fouling.

Besides MAFTech Center, Research Organization for Membrane and Film Technology (MAFTech Organization) was established on July 2007. The mission of MAFTech Organization is to bridge the industry and MAFTech Center together. Now 55 companies are the members of MAFTech Organization. Collaboration between industry and MAFTech Center is progressing on both education and research fields in the support of MAFTech Organization.

# Prof. Koji Kuraoka

Graduate School of Maritime Sciences, Kobe University, Japan

1993 Osaka National Research Institute, AIST, Ministry of Economy, Trade and Industry, Japan

2003 Associate Professor, Graduate School of Maritime Sciences, Kobe University

2014 Professor, Graduate School of Maritime Sciences, Kobe University

Research interest:

Organic-Inorganic Hybrid Materials (Gas Barrier, Separation Membranes and Biodegradable Materials)



## ***“Preparation and properties of organic-inorganic hybrid gas barrier films”***

**Abstract:** The gas barrier property of plastic films is an important factor for their application as packaging materials. Transparent inorganic coatings (SiO<sub>x</sub>, Al<sub>2</sub>O<sub>3</sub> or other metal oxides) on plastic films attracted the attention of many researchers in the food packaging field due to their excellent oxygen and water vapor barrier properties, comparable with conventional aluminum-metallized plastic films, as well as their significant advantages in transparency, microwave compatibility. The deposition of SiO<sub>x</sub> films on polymer films using vapor deposition has been used for gas barrier applications in food and pharmaceutical technologies. Recently, organic-inorganic hybrids were also used for such applications. Incorporation of inorganic

elements at the molecular level in organic polymers has resulted in novel properties such as improved mechanical strength and thermal stability. Moreover, the incorporation of organic elements can likewise improve on the brittleness of inorganic materials.

In the present presentation, I wish to introduce silica/poly (vinyl alcohol) organic-inorganic hybrid gas barrier films via the sol-gel method by microwave irradiation and layered double hydroxide/poly (methyl methacrylate) organic-inorganic hybrid gas barrier films. Preparation of the hybrid films will be indicated in detail. Properties of films, such as oxygen and water vapor barrier properties are also discussed.

# Prof. Toshinori Tsuru

Department of Chemical Engineering, Hiroshima University, Japan



Toshinori Tsuru received his Ph.D. degree in 1991 after he graduated from The University of Tokyo in 1983.

He moved to Hiroshima University in 1995, and promoted to a full professor in 2006.

He has been working on membrane science and technology for more than 25 years. His research experience started with nanofiltration, and has expanded to inorganic membranes, including preparation, characterization, transport mechanism, and the applications to various fields (gas, pervaporation, reverse osmosis).

He has been president of The Membrane Society of Japan since 2013, and also an editorial board member in Journal of Membrane Science.

## ***“Silica-based robust membranes for expanding liquid-phase separation”***

**Abstract:** Amorphous silica membranes show highly permselectivity for hydrogen; however, there still remain two technical challenges: pore size control and hydrothermal stability.<sup>1)</sup> Castricum et al.<sup>2)</sup> reported hybrid silica membranes using bis (triethoxysilyl)ethane, which showed excellent hydrothermal stability in pervaporation of aqueous alcohol solutions. We recently proposed a new strategy to control pore sizes of silica membranes using bridged alkoxides.<sup>3-8)</sup> Bis (triethoxysilyl) ethane (BTESE), consisting of ethane group between 2 silicon atoms (-Si-CH<sub>2</sub>-CH<sub>2</sub>-Si-) as the minimum unit in hydrolysis and condensation reaction, was found to lead to loose silica networks. BTESE silica membranes showed approximately one order magnitude high H<sub>2</sub> permeance compared with previously reported silica membranes using TEOS (tetraethoxysilane), and a high H<sub>2</sub> to SF<sub>6</sub> permeance ratio of more than 1,000 with a low H<sub>2</sub> to N<sub>2</sub> selectivity (~10).<sup>3)</sup> Applications, including gas separation (hydrogen, organic gas<sup>3-6)</sup> and liquid phase separation (reverse osmosis<sup>7)</sup>, pervaporation<sup>8)</sup>, will be

also discussed. BTESE membrane showed quite high rejection for NaCl and high stability to chlorine in reverse osmosis.

### **References:**

- 1) T. Tsuru, *J. Sol-Gel Sci. Technol.*, 46 (2008) 349; *J. Japan Petroleum Institute* 54 (2011) 277.
- 2) H.L. Castricum et al., *J. Mater. Chem.* 18 (2008) 2150.
- 3) M. Kanezashi et al., *J. Am. Chem. Soc.* 131 (2009) 414.
- 4) H. R. Lee et al., *AIChE J.* 57 (2011) 2755.
- 5) G. Li et al. *J. Membr. Sci.* 379 (2011) 287.
- 6) M. Kanezashi et al. *Ind. Eng. Chem. Res.* 51 (2012) 944.
- 7) R. Xu et al. *Langmuir* 27 (2011) 13996.
- 8) T. Tsuru et al. *J. Membr. Sci.* 421-422 (2012) 25-31.

# Prof. Bart Van der Bruggen

KU Leuven, Belgium



Bart Van der Bruggen is a chemical engineer by education. After obtaining his PhD at KU Leuven, Belgium.

He worked as a visiting scientist at the University of North Carolina in Chapel Hill, the Institute for Membrane Technology in Calabria, Italy, and Lappeenranta University of Technology in Finland.

In 2004 he obtained a permanent position at KU Leuven in Belgium (professor since 2009), where he leads a group of 20 PhD students in the research division "Process Engineering for Sustainable Systems" within the department of Chemical Engineering.

He authored over 240 publications in international journals (current h-factor: 42) and 25 book chapters.

He received several national and international prizes as a recognition for his work, including the Prince Sultan Bin Abdulaziz International Prize for Water, 4th Award (2008-2010) in the 3rd Branch – Alternative (Non-traditional) Water Resources.

In addition to his activities at KU Leuven, he also served as Executive Editor for Journal of Chemical Technology and Biotechnology, and as Editor for Separation and Purification Technology.

He served in the Council of the European Membrane Society (EMS) between 2006 and 2010 and was Vice-President from 2008 to 2010.

In 2012 he was re-elected for a new term (2013-2017) in the Council, where he serves as the current President of the EMS.

Since 2014 he is also Extraordinary Professor in Tshwane University of Technology.

See also: [https://cit.kuleuven.be/process/bart\\_van\\_der\\_bruggen](https://cit.kuleuven.be/process/bart_van_der_bruggen)

## ***"Beyond desalination: advanced applications of electrodialysis"***

**Abstract:** Electrodialysis is a separation process that remained a niche technology for a long time, with only one important application: desalination of brackish water. This has changed in recent years, for several reasons. One of these is the high interest in particularly China, yielding not only new applications but also new membrane types. A second reason is the development of new stack configurations allowing for advanced separations, combined with the use of more selective membranes. A third reason is the breakthrough of bipolar membranes, serving as extraordinary engineering tools in stack design. This presentation gives an overview of (some) new applications that result from this evolution, in Europe as well as in China. These are mostly focused on resource recovery, targeting not only water recycling but rather the selective concentration and upgrading of e.g., phosphates, acids and bases, but also specific products in chemical and pharmaceutical synthesis and heavy metals in waste streams from the metal plating industry. Several of these make use of bipolar membranes, but also classical stacks or stacks with an alternative design can be used. Applications are described on lab scale, pilot scale and industrial scale. Conclusions and perspectives for electrodialysis are given.



# Prof. Ivo Vankelecom

KU Leuven, Belgium

Ivo Vankelecom graduated in 1990 as bio-engineer at KU Leuven (Belgium) where he also obtained his PhD in 1994 on "Inorganic Porous Fillers in Polymer Membranes". He subsequently worked as postdoc at KU Leuven, at Beersheva University (Israel) and at Imperial College (London, England). Since 2002, he is professor at KU Leuven teaching Membrane Technology, Adsorption and Chromatography. He has more than 20 peer-reviewed papers, 1 spin-off and 18 patents.



## ***"Molecular design of membranes for SRNF, GS and MBRs"***

**Abstract:** Solvent resistant nanofiltration (SRNF) is a quite recent development in membrane technology where molecular separations can take place in organic media. Crosslinked polyimide membranes will be presented, in addition to 2 new approaches to prepare interfacially polymerized solvent-stable membranes: by using 'Click' chemistry and by using a method where support impregnation and support crosslinking happen simultaneously. Finally, UV-stabilised SRNF-membranes will be discussed as well as the use of 'green'

solvents in membrane preparations.

In the field of gas separations, carbon-silica mesoporous materials will be shown to lead to so-called reverse-selective membranes when incorporated in PDMS.

Finally, a new concept of biocatalytic membrane reactors will be discussed in which superparamagnetism is applied to bring immobilized enzymes exactly near the surface of the membrane.

# Prof. Nieck E. Benes

Inorganic Membranes, Department of Science and Technology / Mesa+ Institute for Nanotechnology,  
University of Twente, the Netherlands



Prof. Benes has a longstanding history in the field of inorganic and hybrid membranes for molecular separation under harsh conditions.

He received his MSc and honors PhD title from the University of Twente, worked for DSM Research, the Process Design Group of the TU/e, and in 2008 returned to Twente.

Particular current topics include the synthesis of hyper-cross-linked ultrathin membranes, and in-situ and in-operando.

## ***"A new generation of robust hyper-cross-linked hybrid membranes"***

**Abstract:** A new generation of novel hyper-cross-linked ultrathin membranes is presented, consisting of giant molecular networks of alternating polyhedral oligomeric silsesquioxanes and organic bridges.

The thin film membranes are prepared by a facile synthesis procedure, based on interfacial polymerization. The silsequioxanes are provided from an alkaline aqueous solution; the precursors for the organic bridges are dissolved in an organic liquid that is not miscible with water. Upon contact of the liquids a thin ( $\sim 10^{-7}$ m) hybrid film is formed at the liquid-liquid interface. This film consists of a 3D alternating copolymer of the covalently bonded inorganic and organic precursors, with a distribution that is inherently homogeneous on a molecular level. Pertinently, both the inorganic and organic constituents are integral segments of the network; without either of these constituents the network cannot exist. This facilitates hybrid materials characteristics that are distinct from those of the individual constituents. These characteristics are for instance manifested by excellent sieving of small hot gases at temperatures up to 300 °C. Design rules are presented that allow tuning the sieving performance

of the giant molecular networks at such high temperatures.

The combination of the absolute facile fabrication procedure and the tunable chemical architecture of the hybrid membranes is anticipated provide a new and key enabling technology for many important industrial scale applications.



# Session 3

10:00-13:30

## Climate Change and Water Resources Management

Chair: Prof. Satoru Oishi, Kobe University, Japan

Speakers: Dr. Pradeep Mujumdar, Indian Institute of Science, Bangalore, India  
Dr. Carlos de Oliveira Galvao, Federal University of Campina Grande, Brazil  
Dr. Roberto Ranzi, University of Brescia, Italy  
Dr. Ramesh Teegavarapu, Florida Atlantic University, USA  
Dr. Philippe Goubesville, University of Nice Sophia Antipolis, France  
Dr. Young-Oh Kim, Seoul National University, Korea  
Dr. Elipda Kolokytha, Aristotle University of Thessaloniki, Greece  
Dr. Daisuke Nohara, Kyoto University, Japan  
Dr. Satoru Oishi, Kobe University, Japan



Water is an essential element for life as described on the protocol of the 3rd World Water Forum in Kyoto. However, we have a lot of news showing flood disaster, water scarcity and water related disease. Unfortunately, many facts show that Climate Change condition enforces severe agony on many of us. Therefore, we have to establish more sophisticated management of water. The session of "Climate Change and Water Resources Management" consisted of the various aspects of water resources management from theoretical to real implementation. First, it started from the theoretical points of view, by giving three topics entitled, "Hydrologic Impacts of Climate Change: Quantification of Uncertainties", "Impact of Climatic and Anthropogenic Changes on River flows" and "Hydrologic Design under Changing Regional Precipitation Extremes and Characteristics: Influences of Climate Variability and Change". Second, the discussion is followed by application and their impact of climate adapting countermeasure in the local area which is entitled, "Flood protection and resilience strategies by using integrated hydrological model under Climate Change in Vietnam", "Testing Applicability of Real Options for a Flood Mitigation Planning Under Climate Change Agriculture and Climate Change", "The Role of the Water Footprint of Major Crops in Combating Climate Change Agricultural Development in Lake Koronia", "Integrated Reservoir Operation for Adaptive Water Resources Management considering Global and Local Hydro-Meteorological Information" and "Optimization of the Integrated Operation of DAMs using Ensemble Prediction". Finally, the discussion between floor and speakers, among speakers raised the focusing point of our target as feasible application by using strong theoretical background in order to adopt the Climate Change.

## Dr. Pradeep Mujumdar

Indian Institute of Science, Bangalore, India



Prof. P P Mujumdar is currently serving as the KSIIDC Chair Professor in the Department of Civil Engineering, Indian Institute of Science, Bangalore, India.

His recent research contributions include development of new methodologies for quantification and reduction of uncertainties in assessment of climate change impacts on regional precipitation, streamflow, urban and river floods, water demands and river water quality.

He is a recipient of the Alexander von Humboldt Medal (2014) of the European Geosciences Union and the Distinguished Visiting Fellowship of the Royal Academy of Engineering, UK.

He is a Fellow of the Indian Academy of Sciences.

### ***“Hydrologic impacts of climate change: quantification of uncertainties”***

**Abstract:** Climate change results in regional hydrologic change in terms of modifications in water availability, evaporative water demand, floods and droughts, water quality, salinity intrusion and groundwater recharge.

A commonly adopted methodology for assessing the hydrologic impacts of climate change uses the climate projections provided by the General Circulation Models (GCMs) in conjunction with hydrologic models. Hydrologic projections obtained with such procedure are burdened with a large uncertainty introduced by GCMs and emission scenarios, small samples of data used for model calibration, downscaling algorithms and other sources. In this presentation, an overview of recent research carried out by the author's group on quantification and reduction of uncertainties in hydrologic projections is provided. Methodologies developed with conditional random fields, Dempster-Shafer theory, possibility theory, imprecise probabilities and non-stationary extreme value theory are discussed. Specific applications of impacts on streamflows, evaporative water demands, river water quality and urban flooding are presented.



## Dr. Carlos de Oliveira Galvao

Federal University of Campina Grande, Brazil



Associate Professor at the University of Campina Grande, Brazil, is a Civil Engineer (1984) and PhD in Water Resources Engineering (1999).

His main research interests are related to experimental-basin hydrology, climate change and water resources, rainwater harvesting and water resources management.

### ***“EU-Brazil CloudConnect Project: water resources under climate and land-use changes”***

**Abstract:** EU-Brazil CloudConnect Project is a R&D initiative involving research groups and institutions from Brazil and EU, targeting at exploiting new collaborative cloud-computing technologies for application in problems related to health, climate change, biodiversity and water resources. This talk will present an overview of the project and, particularly, the application being developed to identify and

characterize relationships between climate and land-use changes, vegetation biodiversity and water resources. This application uses the cloud-computing environment to process a long time series of digital satellite images over large areas, producing data that can enable enhanced multi-temporal and multi-scale analysis of such relationships.

## Dr. Roberto Ranzi

University of Brescia, Italy



Professor of Hydraulic Structures and Riverbasin monitoring and restoration at the University of Brescia (Italy). He got a PhD in Hydraulic Engineering at Politecnico di Milano. He is author of about 40 publications refereed on Web-of-Science and Scopus with almost 500 citations in hydrology, water resources, hydraulic and environmental engineering.

### ***“Impact of Climatic and Anthropogenic Changes on Riverflows”***

**Abstract:** Long term statistics of river flow regime for some Italian rivers in the Central Alps are presented and compared with precipitation, temperature, land use changes. In particular a new hydrometric series for the Adige river dating back to 1862 is presented and compared with sparse precipitation and temperature data available for the same period. For the same basin a comparison of land use in some mid XIX century cadastral maps show dramatic changes in the land use, thus indicating how the natural afforestation in Europe occurring over the last two decades may be a major anthropogenic factor influencing runoff, more than climatic ones. Impact of other factors, as constructions of reservoirs on riverflow regimes are further discussed.



## Dr. Ramesh Teegavarapu

Florida Atlantic University, USA



Dr. Ramesh Teegavarapu is currently an associate professor in the department of Civil, Environmental and Geomatics department at Florida Atlantic University (FAU), Boca Raton, Florida and leader of the Hydrosystems Research Laboratory (HRL).

His research interests focus on understanding, modeling and managing hydrological systems under varying and changing climate.

### ***“Hydrologic design under changing regional precipitation extremes and characteristics: influences of climate variability and change”***

**Abstract:** Climate change and variability are expected bring changes to hydro-climatic extremes both at regional and global scales. This presentation focuses on climate variability through a comprehensive analysis of influences of inter-year, decadal and multi-decadal coupled oceanic and atmospheric oscillations on regional precipitation extremes and characteristics. Long-term rain gauge, gridded precipitation, future climate change projections-based data from a region in Southeastern United States are used for the analysis. Results from comprehensive evaluations of individual and combined influences of these oscillations using descriptive indices-based assessment of statistically significant changes in rainfall characteristics, identification of spatially varying influences

of oscillations on dry and wet spell transition states, antecedent precipitation prior to extreme events, intra-event temporal distribution of precipitation and changes in temporal occurrences of extremes including dry/wet cycles will be reported. The influences of oscillations in different phases modulating each other with seasonal and spatially varying signatures and their implications on flood control and water supply in the region are assessed. Considering the climate change perspective, statistically downscaled precipitation data from multi-model and multiple scenarios are analyzed. Uncertainties associated with future climate change projections of precipitation extremes, coupled with limitations of climate change models are addressed via new optimal compromise hydrologic design concepts.

# Dr. Philippe Gourbesville

University of Nice Sophia Antipolis, France



Prof. Dr. Philippe Gourbesville, the Director of Polytech Nice Sophia, Nice Sophia Antipolis University, France, has authored more than 120 scientific papers dedicated to hydroinformatics, numerical methods, modeling tools, flood management and resilience.

Those research activities are taking place in various research frameworks including EU - FP7 & FP6, Stic Asie, ICI ECP, AsiaLink and so on.

Philippe has developed the first joint master degree EuroAqua focused on hydroinformatics and water management currently with 11 partners covering all continents.

In 2011, Philippe received by the Hydrotechnic Society of France (SHF) the Special Hydrotechnical Award for his scientific achievements.

## ***Flood protection and resilience strategies by using integrated hydrological model under Climate Change in Vietnam"***

**Abstract:** Climate Change is commonly known as global warming and associated with extreme events. Such process is supposed to be one of the most serious challenges faced by the human beings in the 21st century. Under the impact of these phenomena, extreme climatic phenomena are expected to be more frequent and serious, leading to natural disasters especially related to water. Flood risk represents a major issue especially for developing countries where the economy as well as the adaptation capacity against disaster is still poor. As shown in World Bank studies, with more than 70% of the population working in agriculture, inhabitants essentially concentrate at the coastal plains, Vietnam is among the countries most heavily affected by the consequences of climate change. To get more understanding on the impact of this natural phenomenon to Vietnamese people, a methodology has been elaborated in order to assess different climate scenarios over a large catchment and flood dynamics. The simulations are based on a validated deterministic hydrological model which is integrating geology, soil, topography, river systems and climate variables. The validation of the model is obtained through measurements and observations made at different stations within the catchment. The actual climate in the period of 1998-2004 is properly reproduced by the model and provides a clear view about the flood

processes. Future climate is obtained from downscaled GCM data that provide a scenario for 2094-2100 of hydrological variables. The new simulation allows to analyze the changes in the flood dynamics and to perform the frequency and the return period analysis. The approach allows providing an operational approach for integrating the climate change within the engineering design activities dedicated to flood protection measures and resilience strategies.



## Dr. Young-Oh Kim

Seoul National University, Korea

Dr. Young-Oh Kim is Professor of Department of Civil and Environmental Engineering at Seoul National University, Korea.

He received a Ph.D. degree from University of Washington, USA.

His research interests include hydrologic forecasting, development of simulation and optimization models for water resources systems, and integrated climate change assessments.

He currently serves as a vice chairman of Water Resources Management Committee of IAHR.



### ***“Testing applicability of real options for a flood mitigation planning under climate change”***

**Abstract:** This study proposed use of the Real Options (RO) for water resources planning under climate change uncertainty. With the RO, decision makers are offered flexibility reflecting uncertainty at every stage of a project planning. The RO approach was applied to re-assess the flood mitigation alternatives that have been previously screened using a traditional Discounted Cash Flow (DCF). Valuation of the RO was evaluated using a binomial tree model with two options such as delay and abandonment with 30 years of maturity period. 12 GCM projection scenarios from 2016 to 2045 were incorporated

into the RO procedure to cover the climate change uncertainty. The proposed approach produced two kinds of outcomes: one is the 30-year option tree for each alternative and the other is re-assessed values of the alternatives using the RO valuation (ROV). The outcomes showed that the best alternative chosen by DCF was still the best with ROV but only two alternatives were economically feasible with DCF while all the alternatives became feasible with ROV. Such a result can be crucial because the alternatives revived by ROV may be chosen as the final alternative at the next screening step of feasibility test.

## Dr. Elpida Kolokytha

Aristotle University of Thessaloniki, Greece

Associate Professor in the Division of Hydraulics & Environmental Engineering, Dept. of Civil Engineering, Aristotle University of Thessaloniki, Greece.

Also Affiliate Assoc.

Professor, Colorado State University, Colorado State University, College of Environmental Engineering, Colorado, Fort Collins, USA.

Scientific research interests: sustainable water resources management and engineering, socio-economic aspects of water management, water pricing, transboundary water catchments, Greek and International legal framework of water resources management.

Chairman of the Board of AUTH Center for Integrated Water Resources Management. Active member of several Greek and International water related organizations.

More than 90 publications in Greek and International scientific journals, books, proceedings of conferences and technical reports.

Participation in more than 25 Greek and European research projects funded by EU or other sources.



### ***“Integrated water resources management under climate change in Greek islands. Policy issues to achieve water conservation”***

**Abstract:** The precise levels of climate change sufficient to trigger tipping points (thresholds for abrupt and irreversible change) remain uncertain, scientific evidence is sufficient though, to urge immediate action. Therefore, while climate change mitigation should remain a priority for policy-making, there is also an urgent need to develop adaptation strategies to tackle with the already inevitable climate-change-driven changes in water resources.

Greek islands are water-sensitive entities due to the special conditions that occur. Severe water scarcity conditions that already occur in most of the islands, increased seasonal water demand especially in summer due to tourism, less precipitation and the change in water supply distribution through time and space are the main reasons for a

further deterioration of the already distributed water balances.

This paper presents the water balance of different islands in the Dodecanese complex of islands. First, differences in water availability as well as in water demand in the different islands are discussed. Then, climate change scenarios applied, predict future conditions. By giving emphasis to what water agencies claim as well as what people believe about water scarcity and water conservation issues - from the findings of a field survey conducted in Rodos and Kalymnos islands- this work combines the engineering component together with social and economic considerations to reach an integrated approach towards sustainable water management in the Dodecanese complex of islands.

## Dr. Daisuke Nohara

Kyoto University, Japan

Daisuke Nohara, Assistant Professor at Disaster Prevention Research Institute of Kyoto University, has a background on water resources engineering including real-time reservoir operation, and awarded Doctor of Engineering from Kyoto University in 2011 for the paper titled “Decision support system for real-time reservoir operation considering various kinds of hydro-meteorological information”.



### ***“Integrated reservoir operation for adaptive water resources management considering global and local hydro-meteorological information”***

**Abstract:** Changes in hydrological cycles due to climate change may threaten to reliability of water resources management systems. Effective management of existing reservoirs is therefore important to establish more robust water resources management systems. On the other hand, various types of hydro-meteorological information, which can potentially include useful information for basin water resources management, have been available in recent years, thanks to development of data sharing technologies as well as advancement in observation and prediction techniques of hydro-meteorological states. Reservoir operation can be considered to become more flexible and sophisticated by considering such information in appropriate combination. In this presentation, a real-time reservoir operation method considering various hydro-meteorological information sources is presented in order to contribute to establishment of adaptive and robust water resources management under climate change. Real-time observations and prediction on hydro-meteorological conditions in various spatial and temporal scales are considered to enhance ability of existing reservoirs effectively integrating reservoir operations

for flood and drought managements. A method to analyze the effectiveness of adaptive reservoir operation for flood management considering real-time hydro-meteorological predictions is also discussed.



# Dr. Satoru Oishi Chair

Kobe University, Japan



## EDUCATION:

Graduate from Department of Civil Engineering from Kyoto University  
Master of Engineering from Graduate School of Kyoto University  
Doctor of Engineering from Graduate School of Kyoto University

## WORKING HISTORY:

Research Associate from 1993 to 2000 in DPRI, Kyoto University  
Associate Professor from 2000 to 2009 in University of Yamanashi  
Professor from 2009 to present in KOBE University

## RESEARCH ACTIVITIES:

Urban Safety and Security Issues  
Water Resources Problem during and Post Big Disaster  
Hydrological Application of Advanced Radar System

## ***“Optimization of the integrated operation of dams using ensemble prediction”***

**Abstract:** Flood control is one of the most important issues of reservoir operation. Rivers in island countries like Japan, Philippines and Indonesia that have smaller reservoirs than continental countries needs short-term reservoir operation for flood control. In Japan, typhoons give dominant amount of water to reservoirs. Prior releasing of water that makes effective use of the capacity of a reservoir requires the forecast of rainfall amount (hyetograph). Therefore, weather forecast of typhoons is indispensable for flood control. Oishi and Masuda (2013) developed the reservoir control operation model using stochastic dynamic programming with one week ensemble weather forecast. One week ensemble forecast consists of 51 members, gives many kinds of weather variables including rainfall amount, has lead time of one week. In fact, frequency of updating one week ensemble forecast is a problem for using it. In the present study, a solution for the problem is proposed. For giving highly frequent updating, we propose to use typhoon ensemble forecast which issues four times a day but it does not include rainfall amount. By using a similarity index

with observed typhoon tracks and latest ensemble forecast result, a method to give typhoon ensemble reasonable forecasted rainfall amount has been developed.



# Session 4

14:30-18:00

## Aquaphotonics, “Understanding Water in Biological World”

Chair: Prof. Roumiana Tsenkova, Kobe University, Japan

Speakers: Prof. Masato Yasui, Keio University, Japan

Dr. Aoife Gowen, University College Dublin, Ireland

Dr. Tiziana M. P. Cattaneo, Agricultural Research Council (CRA), Italy

Prof. Albert Krastanov, University of Food Technologies, Bulgaria

Prof. Christian Huck, University of Innsbruck, Austria

Prof. Luc Montagnier, Nobel Laureate, World Foundation for AIDS Research and Prevention

Prof. Harald Martens, Norwegian University of Science and Technology, Norway

Mr. Bernhard Pollner, Kobe University, Japan



Aquaphotonics

# Symposium on Aquaphotonics in Brussels, October 14th 2014

“Aquaphotonics – Understanding water in the Biological World” was one of the 5 sessions of the Kobe University International symposium held in Brussels on the 14th of October this year.

Aquaphotonics is a new field of NIR spectroscopy describing the spectral nature of water in biological systems. It was introduced by Biotechnology Laboratory at the faculty of Agriculture in 2006. Since then, many research studies applying Aquaphotonics have been published and the above-mentioned Symposium provided a good opportunity to summarize some of this research and consider future research paths.

The Aquaphotonics session had 38 attendees representing institutions of 11 countries.

The first part of the session was a summary of the recent results, presented by Roumiana Tsenkova, professor at Kobe University, Japan, Masato Yasui, professor at Keio University, Japan, Aoife Gowen, senior lecturer at University College Dublin, Ireland, and Tiziana Cattaneo, director of Research Unit for Food Process at Agricultural Research Council (CRA) in Milan, Italy. The second part of the session was focused on future applications of Aquaphotonics, presented by Albert Krastanov, professor at University of Food Technologies in Plovdiv, Bulgaria, and by Christian Huck, professor at University of Innsbruck, Austria. The session was closed with two presentations on tools for data analysis given by Prof. Harald Martens from Norway and Bernhard Pollner from Austria, and by remarks from Prof. Tsenkova on the future of Aquaphotonics. There were 11 posters at the Aquaphotonics session, prepared by six working groups from University of Sassari, CRA, Italy; Trakia University, Bulgaria; University of Belgrade, Serbia; Aquaphotonix Study Center, Belgium; Kobe University, Japan. Based on the votes of the attendees, the poster award was given to Eri Chatani, associate professor at Kobe University, for presenting results on water molecular system dynamics in the formation of amyloid fibrils using time-resolved near infrared spectroscopy and Aquaphotonics.

The session was attended by the President, Prof. Fukuda, and other members of Kobe University, too.

The session on Aquaphotonics became the First International Symposium on Aquaphotonics. The second will be held in December 2015, at Kobe University followed by Italy (2016) and Keio University (2017) as hosts of the future symposiums.



# Prof. Roumiana Tsenkova Chair

Kobe University, Japan



Roumiana Tsenkova is professor and head of laboratory at Kobe University.

Recently she proposed aquaphotomics as a new scientific field to study the collective characterization and quantification of pools of water molecules that have the same molecular vibration and hold information on structure, function, and dynamics of organisms or aqueous systems.

## **"Aquaphotomics: past, present and future"**

**Abstract:** Aquaphotomics emerged from non-invasive analysis of biological systems using near infrared spectroscopy where water spectral patterns of bio fluids and tissues were found to be highly informative for the health status and have been used as biomarkers for diagnosis.

Nowadays, it has been applied in various fields. One of them is measuring very low concentrations of the solutes using the water mirror effect on molecular level extended over the near-infrared range of the spectrum where the near-infrared light at various frequencies has been absorbed by different pools of water molecules that have changed correspondingly to the concentration of the solute. Other applications are related to water quality and functionality evaluation, understanding functionality of microorganisms and water molecular changes related to amyloid formation, diagnosis of physiological conditions etc., all based on the holistic approach that the knowledge of water molecular system provides.

The future is towards developing the entire "aquaphotome", i.e. collective characterization of all possible "windows" of electromagnetic

spectrum (Water Matrix Coordinates, WAMACS) where water molecular system could be observed. In the future, we expect to be able to explain how the water spectral pattern is related to the food characteristics and functionalities, like freshness. Very important future direction is to understand how water, as the matrix of life, is changing with the time and environmental changes like temperature, humidity, atmospheric pressure.



# Prof. Masato Yasui

Keio University, Japan



Masato Yasui has been working on water channels, aquaporins in biology and medicine, and has spent eight years at Nobel Laureate Peter Agre's workgroup.

As professor and head of department at Keio University, Tokyo, he focuses on biophysics to understand the behavior and roles of water molecules, and has started collaborations in aquaphotomics.

## **"Water biology: roles of aquaporins (AQP)"**

**Abstract:** Water constitutes roughly 70% of the mass of our body. Water metabolism is one of the most important homeostatic functions. There is a dynamic and precise regulation for water balance in our body; secretion such as tears or saliva and absorption in digestive tracts or kidney. Disturbance in water balance can be seen in many clinical disorders from dry syndromes to brain edema. The discovery of the water channel aquaporin (AQP) greatly expanded our understanding of the regulation of the water permeability of biological membranes.

We have introduced a couple of new technologies in order to understand further water dynamics and biological relevance of AQP

in the living system. A nonlinear optical microscopy technique, the coherent anti-stokes Raman scattering (CARS) imaging, has been applied to directly and quantitatively imaging water transport through cell membranes.

We introduce "Aquaphotomics" approach to access water dynamics of the cells as well as AQP functions. Molecular dynamics simulation is also used to evaluate our experimental findings. Taken together, we try to understand life science better by focusing on water molecule behaviors; how water molecules contribute to the complex of life phenomenon, especially self-organization under non-linear open system.

## Dr. Aoife Gowen

University College Dublin, Ireland

Aoife Gowen as a post-doctoral researcher investigated the intersection of near infrared spectroscopy, chemical imaging and chemometrics for characterization of biological systems. Nowadays, as senior lecturer at University College Dublin, her research area is multidisciplinary, involving applications of sensor technology and chemometrics to biological systems, including food quality process monitoring.



### ***“Aquaphotomics and NIR hyperspectral imaging as tools for understanding the role of water in foods”***

**Abstract:** Despite recent advances in food product development (e.g. nutraceuticals and functional foods) our understanding of the role of water in foods is still in its infancy. Monitoring of food quality via optical methods such as near infrared (NIR) and terahertz spectroscopy is made possible due to the interaction of electromagnetic energy and the water matrix.

Aquaphotomics provides a framework for understanding the role of water in food systems and processes. This paper highlights the importance of water in food quality and presents a number of case studies that demonstrate the potential of NIR hyperspectral imaging for monitoring food quality through analysis of water absorbance bands.



## Dr. Tiziana M.P. Cattaneo

Director, Research Unit for Food Processes, Agricultural Research Council (CRA), Milan, Italy

Tiziana Cattaneo has been employed by the CRA, for more than 25 years. She has begun research in NIRS more than 15 years ago. As President of the Italian Society for NIRS, she continues improving the development on NIRS. Fields of research: milk and dairy, fruits and vegetables.



### ***“Aquaphotomics in food science and agriculture”***

**Abstract:** The role of water and its influence on absorption in NIR range has been studied over 40 years. In the past, the presence of water was often considered as a limit for the calibration performance of other constituents, in particular for applications in food and agriculture fields. The Aquaphotomics concept helps to positively evaluate the water changes occurring, after physical or chemical perturbations, in different and several bio-systems.

The direct monitoring of food processes or/and chemical and physical changes in biological matrices is not often possible. These information can be collected through the study of water patterns in NIR region. Examples of Aquaphotomics application in food science (cheese ripening, effect of packaging on shelf life and product quality, scattering and absorption contribution, rice quality, etc.) will be shown in supporting the approach transferability following a correct flow-sheet of actions to demonstrate biological changes, rearrangements, and process behaviours.



# Prof. Albert Krastanov

Professor, Department of Biotechnology, University of Food Technologies, Plovdiv, Bulgaria

Albert Krastanov is professor and head of department at University of Food Technologies in Plovdiv, while he is visiting professor at several foreign universities. His research interests are in different fields of biotechnology science – industrial and applied enzymology and immobilized cells technology, industrial microbiology and bio-product analyses.



## ***Aquaphotomics in biotechnology - new tools and opportunities***

**Abstract:** In recent years, the new approach of “aquaphotomics” has been proposed. This presentation focuses on recent applications of aquaphotomics in the pharmaceutical technology, medicine, food technology and for monitoring of food quality through observation of water absorbance bands. However, the use of aquaphotomics as a tool for microbiological monitoring, ecological and physiological and biochemical research remains underdeveloped.

There is a lot of potential for new applications of aquaphotomics tools in the field of biotechnology and biochemistry - identification of microorganisms, monitoring of fermentation processes (growth rate and production rate), specification of metabolites, mass transfer in bioreactors, measuring the activity of enzymes, etc. Special attention will be made for aquaphotomics as a tool in the reveal of molecular mechanism of enzyme reactions, especially for hydrolases. Application of aquaphotomics as a new highly effective method for selection of probiotic bacteria strains through the analysis of the

spectral changes caused by varying water molecular arrangement in the solution as a molecular mirror for the rest of the solution will be also discussed.



# Prof. Christian Huck

Professor, Institute of Analytical Chemistry and Radiochemistry, University of Innsbruck, Innsbruck, Austria

Christian Huck is professor and deputy head of the institute for analytical chemistry at University of Innsbruck. He holds several national and international awards, and as author of numerous scientific papers, editorial member of journals in vibrational spectroscopy, and guest professor in foreign countries, he has built up a wide international scientific network.



## ***Aquaphotomics in natural product analysis***

**Abstract:** Nowadays, the field of natural product analysis is urgently demanding for the establishment of the Aquaphotomics approach due to the following reasons:

On one side NIR absorption spectra of water in food products might give a hint to their geographical provenience. This is of huge economic importance as farming gets more and more pressurized by its high production costs, opening of the markets and globalization. To be able to compete against cheaper sustainably producing competitors, the added value of these products must be made credible for the consumer in order to achieve reasonable prices. In the field of medicinal plant analysis also the determination of the geographic origin and plants species plays a crucial role. Additionally,

it is known that the water balance is essential for the medicinal effects and therefore deeper insights are strongly demanded.

On the other hand the Aquaphotomics approach offers huge potential to establish new methods for the fast quality control of different types of contaminants.

The advantages to be expected by introducing Aquaphotomics in natural products analysis can be summarized as following: Simultaneous, fast and non-invasive determination of geographic provenience, determination of species together with a quantitative analysis of main ingredients, and a check for critical contamination as well, new insights into a natural products' water balance.

## **Prof. Luc Montagnier** (Unable to attend)

Nobel Laureate, President, World Foundation for AIDS Research and Prevention, France



Luc Montagnier led the team at Pasteur Institute which first isolated the HIV1 virus for which he was awarded the Nobel Prize for Medicine. As President of the World Foundation for AIDS Research & Prevention, he has co-founded two centers for the prevention, treatment, research and diagnosis of AIDS patients in Ivory Coast and Cameroon. His current studies bear on the diagnosis and treatment of microbial and viral factors associated with cancers, neurodegenerative and articular diseases using innovative technologies.

### ***"Photonic transduction of DNA information in living cells Co-authors: Jamal Aissa and Claude Lavallee"***

**Abstract:** We have previously reported the recording of electromagnetic signals (EMS) produced by aqueous dilutions of bacterial and viral DNAs. These recordings can be stored under a digitized form in lap top computers and sent via internet to distant recipient laboratories.

The original DNA sequences were retrieved from water nanostructures induced by EMS by means of the ingredients of Polymerase Chain Reaction (PCR) using a thermo-resistant polymerase (TAQ).

We have now come to a new stage: instead of using PCR, we have exposed human living cells cultured in flasks to the amplified EMS of a bacterial DNA sequence. After several days of exposure, we have

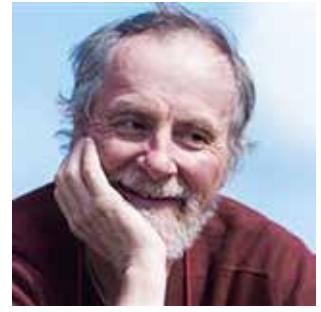
found the specific bacterial DNA sequence in these cells. At the same time, these cells of tumoral origin, are inhibited in their growth and finally die.

This indicates that such cells do possess the machinery to "read" the message coming from the EMS and synthesize accordingly the foreign DNA.

Here we demonstrate a further step: that the latter process can be carried out by living cells in culture, indicating that these cells do possess the system to read the sequences from water nanostructures. Therefore this system does exist in nature.

# Prof. Harald Martens

Professor, Department of Engineering Cybernetics  
Norwegian University of Science and Technology, Trondheim, Norway



Harald Martens has been working in chemometrics since the beginning of 1970s. He has had a great influence on the field, developed several new methods, written numerous scientific papers, books and had lectures all over the world. At NTNU he focuses on combining multivariate measurement-driven and knowledge-driven modelling.

## ***“Multivariate data-modelling to separate light scattering from light absorbance: The Optimized Extended Multiplicative Signal Correction OEMSC”***

**Abstract:** Non-linear modelling of spectra: Measurements of light intensity are often affected by a number of different causes. If they have sufficiently different spectral profiles, they may – in principle – be distinguished and quantified by multi-wavelength measurements and multivariate calibration. But high-sensitivity aquaphotomics may call for a combination of different mathematical forms in this modelling process.

For instance, physical variation in specular- or stray light gives additive effects in the raw reflectance or transmittance measurements. Variations in a sample's different chemical constituent concentrations (as expected in aquaphotomics) give multiplicative raw signal changes (additive in absorbance), and so does instrumental light source variation. Physical optical path length variation due to sample thickness or light scattering gives exponential effects in the raw signals (multiplicative in absorbance). Ideally, to calibrate a diffuse spectrophotometer efficiently, one ought to handle the different types of physical and chemical signal contributions mathematically according to their contribution types. So there is not only Reflectance R; there may be e.g. a whole “ladder of logs” to be handled: [R,

$\log(R)$ ,  $\log(\log(R))$ , ...]. Therefore, the simple additive model is not the answer to all calibration problems. More mechanistic modelling may be required. The trick is to apply our prior knowledge in mathematical modelling, without causing information loss, supporting wishful thinking or creating computational nightmares.

This lecture concerns the pragmatic but multivariate use of mathematics and statistics to distinguish various types of variation in spectroscopic measurements. The Extended Multiplicative Signal Correction (EMSC) facilitates the separation of additive chemical light absorbance and multiplicative physical light scattering. Combined with multivariate metamodelling, the EMSC can give faster mechanistic modelling of biological systems (e.g. Mie scattering in FTIR spectra of cancer cells). The EMSC has recently been developed into Optimized EMSC (OEMSC), for more versatile handling of combined additive & multiplicative calibration problems in complex systems. I shall point out how I think the OEMSC might be useful in aquaphotomics and other systems that still have too many unknowns for traditional mechanistic modelling.

# Mr. Bernhard Pollner

PhD student, Biomeasurement Technology Laboratory, Graduate School of Agricultural Science, Kobe University, Kobe, Japan/Scientific Consultant, Innsbruck, Austria



Bernhard Pollner graduated as a Medical Doctor from Innsbruck Medical School and works as a self-employed scientific consultant. He will start his joint PhD course at Kobe University, University of Innsbruck and Innsbruck Medical School. His works focus on theories and models of water structure, information in water and bio-systems.

## ***“Demonstrations of new tools for spectral data analysis”***

**Abstract:** The discovery of new scientific findings requires more and more often the perception of many parameters simultaneously, which results complex multivariate data matrices. The extraction of the useful information and the determination of the relationships in such complex data structures need the application of multivariate data evaluation methods, i.e. chemometrics in the field of biological and chemical sciences.

To ensure the rapid and extensive development of modern water researches the ongoing development of new chemometrics tools is essential. The work reported here introduces the easy to use application and interpretation of recently developed statistical methods for the data evaluation in near infrared (NIR) spectroscopy, revealing interaction of electromagnetic energy and water as a system point of view, i.e. Aquaphotomics approach.



# Session 5

10:00-18:00

## Forefront Studies on Japanese Culture and Society

Speakers: Mr. Yoichiro Yamada, Deputy Chief of Mission/Minister, Embassy of Japan in Belgium

Mr. Brian Toll, Policy Officer, Directorate - General for Education and Culture, European Commission

Prof. Bjarke Frelesvig, Chair, Faculty of Oriental Studies University of Oxford, UK

Dr. Sebastien Lechevalier, President, France-Japan Foundation, École des hautes études en sciences sociales, France

Prof. Dr. Dimitri Vanoverbeke, KU Leuven, Belgium

Prof. Theodore Bestor, Director of the Reischauer Institute of Japanese Studies, Harvard University, USA

Prof. Andreas Thele, University of Liege, Belgium

Prof. Ian Neary, Nissan Institute, University of Oxford, UK

Prof. Marta Kudelska, Director, Centre for Comparative Studies of Civilizations, Jagiellonian University, Poland

Prof. Dr. Joerg B. Quenzer, Director, Asia-Africa-Institute, University of Hamburg, Germany

Prof. Bonaventura Ruperti, Ca' Foscari University of Venice, Italy

Dr. Linda Flores, Oxford University, UK

Prof. Mitsuko Okamoto, Director, Graduate School of Film and New Media, Tokyo University of the Arts, Japan

Prof. Pascal Lefèvre, Leuven University, Belgium

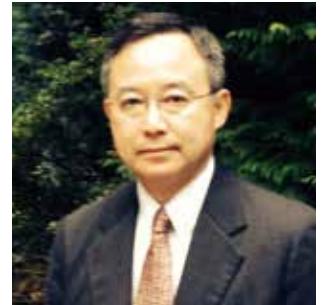
Mr. Francesco Fiore, General Manager, Hello Kitty Live, Director, Axxe Ltd, (London) , UK





## Mr. Yoichiro Yamada

Deputy Chief of Mission/Minister, Embassy of Japan in Belgium



Mr. Yoichiro Yamada is a Japanese diplomat.

He has served in Moscow, Brussels, Warsaw, New York, Nairobi.

He is Deputy Chief of Mission of the Embassy of Japan in Belgium since September 2013. Mr. Yamada speaks Japanese, English and Russian.

### ***“Cultural Relationships between Japan, Belgium and Europe”***

## Mr. Brian Toll

Policy Officer, Directorate - General for Education and Culture, European Commission



Brian Toll joined the European Commission in 1993 and is responsible for international cooperation with Japan in the Directorate-General for Education and Culture. Previously, Brian worked extensively in academia, as a lecturer and researcher. He completed his post-graduate studies in education and holds an undergraduate degree in Russian studies.

### ***“International Cooperation in Higher Education in relation to European and Japanese Studies”***

**Abstract:** The European Union budget has been under particular pressure in the wake of the global economic downturn. Cuts have been introduced for the first time in almost every domain of EU activity but even more money has been turned towards global education, youth, research and innovation initiatives. In particular, the Erasmus+ programme aims to boost skills and employability, as well as modernising education, training, and youth work. In sport, there will be support for grassroots projects and cross-border challenges such as combating match-fixing, doping, violence and racism. Marie Skłodowska-Curie actions, funded under the 'Excellent Science' pillar of the Horizon 2020 research programme, will support the career development and training of researchers – with a focus on innovation skills – in all scientific disciplines through worldwide and cross-sector mobility. And Creative Europe will support the culture and media sectors by promoting cross-border cooperation, platforms, networking, literary translation and the development, distribution, or access to audio-visual works.



# Prof. Bjarke Frellervig

Director, Research Centre for Japanese Language and Linguistics, Oriental Institute, University of Oxford, UK



Ph.D. (1993), Copenhagen. Since finishing my doctorate I worked in Aarhus, Copenhagen and Oslo before coming to Oslo in 1999. My research is on the history of the Japanese language.

Recent books:

A history of the Japanese language (CUP, 2010);

Proto-Japanese: Issues and prospects (co-editor and contributor, 2008, John Benjamins)

Current posts and positions

Professor of Japanese Linguistics, University of Oxford.

Fellow, Hertford College, University of Oxford.

Director, Research Centre of Japanese Language and Linguistics, University of Oxford

Chair, Faculty of Oriental Studies, University of Oxford.

President, the European Association for Japanese Studies

## “Japanese Linguistics and Europe”

**Abstract:** In this talk I will briefly talk about the history and current state of Japanese Linguistics in Europe. I will then address the role and importance of Japanese Linguistics for the development

of Japanese Studies in Europe, as well as conversely the role and importance of Europe in the development of Japanese Linguistics.

# Dr. Sébastien Lechevalier

President, France-Japan Foundation, École des hautes études en sciences sociales, France



Sébastien Lechevalier is Associate Professor at L'École des Hautes Études en Sciences Sociales (EHESS, Paris) and President of Fondation France Japon de l'EHESS (EHESS Paris 日仏財団).

His research focuses on the Japanese economy, corporate diversity, evolution of welfare systems in Asia, and inequalities.

His recent publications include: The Great Transformation of the Japanese Capitalism (Routledge, 2014).

## “Japanese studies and economics”

**Abstract:** From the viewpoint of standard economics, there is no place for area studies and even less for Japanese studies. However, during the 1970s-1980s, when the Japanese economy overcame the European economies and was about to overcome the US economy, it attracted the attention of many non-Japanese economists, who elaborated various competing theories of the so-called “Japanese model”. The point was that not only the Japanese economic system seemed to be more efficient than the European and US ones but it also seemed not to fully follow the basic rules taught in economics textbook.

This period is over for two decades now and the interest for both the Japanese economy and specialists of Japanese studies has

drastically declined. In this presentation, we will argue there are however various options for a revival of the interest of economics for Japan. Putting aside the marketing flavor of concepts and practices such as “Abenomics”, we will emphasize the following points: 1) the necessity to continue opening the access to Japanese micro-data for foreign researchers in order to allow them conducting comparative research; 2) the importance of studying the Japanese economy in its Asian context and of avoiding perspectives that insist on the specificities of Japan; 3) the merit of moving beyond mainstream economics in mobilizing theoretical frameworks borrowing to socio-economics, institutional economics and political economy.

# Prof. Dr. Dimitri Vanoverbeke

KU Leuven, Belgium

Dimitri Vanoverbeke holds a PhD from Leuven University (Belgium) and lectures in Japanese Studies at the department of Area Studies at Leuven University.

He is director of the Research Unit (Department) of Area Studies there and also lectures in the Europe-Asia: Interactions and Comparisons module of the Master of Arts in European Studies: Transnational and Global Perspectives (MAES) at Leuven University (KU Leuven).

He is a guest professor at the university of Lyon III (Jean Moulin), has been a guest professor at Tokyo University's Social Science Institute and is regularly lecturing and conducting research at Kyushu University and Kobe University.

His research deals with judicial policy-making, the function of legal institutions and the relationship between law, politics and society in modern and contemporary Japan as well as with regional cooperation and human rights in East Asia.



**Abstract:** Many scholars in the Low Countries (the Netherlands and Belgium) and France have been interested in various aspects of Japanese law. Because interest involved scholars in law faculties, Japanese studies and practitioners, and because of close links between these groups, there has not always been a clear division between socio-legal work and black-letter law. We will retrace the main stages and approaches in the study of Japanese law by focusing on the often-neglected work of scholars in Japanese studies focusing on law in Japan in the Low Countries and France. An important period in the Japanese studies discourse in law in Japan

was triggered by the success of the Japanese economy in the 1960s which spurred interest in Japanese law beyond the academic world. Various phases or periods can be seen in the perception of Japanese law in France and the Low Countries. The themes in and approaches to Japanese law developed over time along with the social environment and political and economic demands of Belgian, French and Dutch societies. I will (over)generalize by dividing the approaches to Japanese law in France and the low countries into several phases and also focus on more recent scholarship in this field which is for sure promising but in quest of an own identity and methodology.

# Prof. Theodore Bestor

Reischauer Institute of Japanese Studies, Harvard University, USA

Theodore C. Bestor is the Reischauer Institute Professor of Social Anthropology and Japanese Studies in the Department of Anthropology at Harvard University.

He is a specialist on contemporary Japanese society and culture.

He has written widely on urban culture and history, markets and economic organization including supply chains, food culture, the fishing industry and the global environment, and popular culture.

He received his Ph.D. from Stanford University in 1983.



## ***An overview of Japanese Studies in the United States***

**Abstract:** Bestor will present an overview of the organizational structure of Japanese studies in the US, including major university centers, library resources, funding agencies, and professional organizations, and discuss recent trends in the field.

After March 11, 2011, Harvard's Reischauer Institute of Japanese Studies immediately began to collect and catalogue digital media

about the disasters — emails, twitter feeds, photographs, video clips, government reports, NGO bulletins, and so forth. We have now assembled over 1.2 million items, all of which are freely accessible to anyone anywhere in the world. Bestor will introduce the archive and its use, and discuss some of the challenges facing digital research now and in the future.

# Prof. Andreas Thele

University of Liège, Belgium

In 1993 Andreas Thele obtained a Ph.D. from the University of Düsseldorf after research at Tsukuba University and the "Eastern Institute", Tokyo (1989-1991).

Professor at the University of Liège since 1995, he is the Director of the Centre for Japanese Studies (CEJ) since 2010. He also teaches Japanese language and civilization at the University of Mons since 1994.



## ***"Aspects of Japanese studies in belgium"***

**Abstract:** In my talk I would like to present various facets of the splendors and miseries of Japanese Studies in Belgium. The specific situation of the educational system in the country, its separation into a Flemish and a French speaking part, gives itself some indication of a multicultural approach towards the Japanese culture, reflected by the role Japanese Studies play in various institutions of higher

education. To enhance some of these aspects I will focus especially on the situation of Wallonia, the French speaking region of Belgium. Once having set the scene I will try to analyse different possibilities for the development of Japanese Studies in the light of Comparative Thinking.

# Prof. Ian Neary

Nissan Institute University of Oxford, UK

Professor Ian Neary is the professor in the politics of Japan, the Head of the School of Interdisciplinary Area Studies at Oxford University and a Faculty Fellow at St. Antony's College. He has written about various aspects of human rights policy mainly in Japan, but also in South Korea and Taiwan, and has produced a textbook on Japanese politics. He is currently starting a project on the evolution and impact of the Dowa Projects Policy which he will continue as a visiting professor in Kyushu University from January 2015.



## ***"The study of Japanese politics"***

**Abstract:** The presentation will review the broad trends within the study of Japanese politics outside Japan since the end of the occupation. It will note the increase of study of Japan's political economy during the high growth era and the more recent emphasis

on narrower definitions of the appropriate scope of political science, particularly in the North America. It will close with a consideration of how an 'area studies' approach to the study of Japanese politics may contribute to a more nuanced understanding.

## Prof. Marta Kudelska

Director, Centre for Comparative Studies of Civilizations, Jagiellonian University, Poland



Marta Kudelska is a Professor and the Chair of the Centre for Comparative Studies of Civilisations, Jagiellonian University.

Her researches include Indian philosophy and Sanskrit literature.

Main book publications: The Cosmological Scheme of the Classical Upanishads (1996), The Vision of the World in the Philosophical Thought of India (2003, in Polish), Why There Is 'I' Rather Than 'This'. Subject Ontology in the Upanishads. (2009, in Polish)

She has also translated the Bhagavadgita and Upanishads from Sanskrit into Polish.

### ***“Project of Comparative Studies – Past and Perspectives”***

**Abstract:** The Centre for Comparative Studies of Civilisations is an academic centre located in Kraków and structurally it belongs to the Philosophy Department of Jagiellonian University in Kraków. The Centre came to life in 2005 when it separated from the Institute of Sociology and became an autonomous unit.

The Centre serves as the hub connecting both researchers and academic teachers, which makes it a unique place not only in Poland but also in Europe. The profile of the Centre, that is Cultural Studies, is broad enough to include and encompass virtually almost any discipline classified as “humanities”. This makes the scope of the research conducted here unlimited; therefore, both researchers and students can pursue and explore their broad fields of interest.

For students the Centre offers courses grouped in four main categories. Those were divided along the four main civilizations circles:

- Western civilization (Europe and Americas)
- Islam civilization (Arabic world, Iran along with Persian language influenced regions, South-East Asia)
- Confucian civilization (China, Japan, Korea, Vietnam)
- India civilization (India, Nepal, Thailand, Burma, Laos and Cambodia)

Each civilization circle is then divided into smaller areas of more detail-oriented courses. In case of i.e. Japan, there are courses covering almost every field of interest: history, culture, literature, language (on various levels of proficiency), modern culture (movies, anime courses, etc.).

The Centre allows students to graduate with BA and MA in cultural studies. Since 2011, a new specialty has been present here – Buddhist Studies, as an answer to the growing interest in the research focused on this tradition of East Asia and its reception in the West.

## Prof. Dr. Jörg B. Quenzer

Asien-Afrika-Institut Abt. für Sprache und Kultur Japans, Universität Hamburg, Germany



Jörg Quenzer studied Japanese Studies, German Literature and Philosophy at the University of Cologne (Ph.D., Habilitation). His PhD thesis explores the role of dreams within Buddhism in medieval Japan. Since 2006 he is professor of Japanese Studies at the University of Hamburg, since 2009 he acts as deputy director of the research group “Manuscript Cultures in Asia and Africa”.

### ***“Speaking of the path – conceptual metaphors in Japanese literature”***

**Abstract:** Metaphors are some of the most powerful elements of human language. This talk tries to explore its use by poets, especially

the founder of classic Haiku, Bashô, as a means of poetic expression.

# Prof. Bonaventura Ruperti

Ca' Foscari University of Venice, Italy



Bonaventura Ruperti is a Professor in the Department of Asian and North African Studies at Università Ca' Foscari in Venice, Italy.

He received his Ph.D. from the Istituto Universitario Orientale in Naples, in 1992. A specialist in Japanese theatre, he attended postgraduate courses at Waseda University, in 1994 he has been a Japan Foundation fellow researcher, and in 2004-5 a visiting professor at the National Institute of Japanese Literature.

He is the author of various articles on nō, kabuki and bunraku.

He is presently working on the borrowing from nō in haikai poetry.

He has also translated some short stories by Izumi Kyōka into Italian.

## "Arts and Japanese Studies"

**Abstract:** My main research field is Japanese Theatre, in particular the traditional theatre genres, nō, ningyōjōruri, kabuki, i. e. Japanese performing arts, not specifically Fine Arts.

However, in Japan, the creative productions are traditionally a combination of several elements and frequently use a combination of different arts, a combination that in performing arts becomes a total work of art at live; not a 'synthesis', but a composition of the arts, a composition of several disciplines.

In fact, in Japanese tradition we can often find works of art that make use of different elements, and theatre/performing arts in particular make/s use of all (or many) art forms, all (or many) major constituents of the arts: words-literature-poetry-narration/epic, singing and music, acting and dance etc.

Originally ideographic writing in China and in Japan is not only a representation of sounds (as phonetic writing systems, alphabets or other, are), but also a sign, an image, that is kanji. Kanji (Chinese characters) also possess a visual value as images, and an aesthetic value.

According to tradition, in China and Japan painting derives from calligraphy ("calligraphy and painting derive from the same root") and in fact the combination of writing and painting is widely diffused. The works of Fine arts are often a combination of drawing or painting and writing/calligraphy.

Art forms often combine visual elements with performance/performative elements (e.g., in film) and the written word (e.g., in comics).

In the Japanese Fine arts tradition, in an art work the individual contributions from interrelated and collaborating arts blend together and compensate each other, and this combination/balance somehow forms a new world.

The practice of adding a written text to a painting dates back at least to the Heian period: (this is the case of) waka poems 和歌 inscribed on shikishigata attached to sliding and folding screens (shōji e 障子絵 and byōbu e 屏風絵), or gasan imported to Japan from China (mainly by Zen monks), or shigajiku 詩画軸, an art form in which a simple ink painting was embellished with a complementary inscription, and such inscriptions and paintings were intended to be appreciated together.

We can find for instance the combination of images/pictorial subjects and poetry in the so-called byōbu uta, poems/verses on themes painted on folding screens. In this way, many poems were inscribed on folding screens: these were poems composed following the pictures on folding screens so that painting combined with the poetic contexts of

the verses.

But besides this harmony between painting and poetry, as we know, we can also consider the interactions between painting and narrative: narrative painting depicting battles, romance, religion, folktales, and even stories of the supernatural world, i.e. emakimono (繪巻物 literally 'picture scroll'), emaki (繪巻), a horizontal, illustrated narrative form created during the 11th to 16th centuries in Japan, painted, or stamped on a handscroll, which combines both text and pictures by joining together several scenes, alternating illustrations and their (verbal) descriptions (most handscrolls contain a calligraphic explanation of the story, either at the beginning of the scroll or directly preceding each scene).

Vertical hanging scrolls (kakejiku) too, consisting of one entire scene rather than a series of scenes, as opposed to handscrolls, are usually created by resorting only to painting or only to calligraphy, but, still, we can frequently find the interaction/combination of writing and images.

In any type of art medium we can recognise these characteristics.

Similarly/in a different way, can recognize the practice of painting with gasan, a kind of poetic inscription, added to a blank area above or next to a completed painting. This inscription gives expression to the aesthetic value or content of the work, in the form of a poem or commentary with religious implications. In some cases, the inscription was written by a contemporary of the artist: a friend, associate, or patron; in other cases, the inscription was written long after the painting was completed by a connoisseur or collector.

And this matching of the aesthetical effects of poetical/lyrical verses, images and narrative techniques was inherited by Ukiyo-e 浮世絵 or Manga 漫画 productions.

However, on the other hand, words are also sound (in origin with a magic power), and language is intimately connected with music. And in Japanese tradition, the main stream is focused/centered on vocal music, a combination of words and songs: (they can be found) in rituals, in chanting, in prayers, in banquets, in performances, from waka poems 和歌 in utawase, to gagaku's accompanied songs (utaimono), from ritual performances (known as) kagurauta 神楽歌, to popular dances (azumaasobi 東遊び etc.), to the saibara 催馬樂 and rōei 朗詠 (chinese poetry intonation) song forms of the Heian court etc.

But in these forms of vocal music, all the genres (either for solo voices or voices in combination), generally have instrumental accompaniment, so music (prevalently monophonic music having a single line of melody) generally combines with instrumental music.

And as music builds on language structures, that implies that music evolved after language; in the same way, dance and music as well are intimately associated.

In conclusion, in Japanese traditional theatres, and in Japanese performing arts, consisting of or combining several disciplines, this combination of several constituents of art (literature and music, vocal and instrumental music, acting and dance etc.) attains the highest refinement and complexity/accomplishment.

In this perspective we can say that in order to study Japanese culture

and its artistic productions and phenomena, the multidisciplinary approach is in fact natural and inevitable.

Interdisciplinarity involves the combination of multiple academic disciplines by which we can cross and think across those boundaries that we can find in Western traditional distinctions between disciplines or schools.

Therefore, interdisciplinary methods are better suited to aesthetical productions where it is required to understand a given subject in terms of multiple traditional disciplines.

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## Dr. Linda Flores

University of Oxford, UK

Dr. Linda Flores is an Associate Professor in Modern Japanese Literature at the University of Oxford and a Fellow of Pembroke College, Oxford.

She specialises in women's literature, gender theory, and proletarian writing and is currently organising an international conference titled 'Trauma and Narrative in Japan'.



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### "Modern Japanese Literature: Recent Trends in Scholarship"

**Abstract:** This presentation examines recent trends in modern Japanese literary studies. This includes: (1) Interrogating Western models (feminism, psychoanalysis); (2) "Transnational Feminisms"; the "Trauma and Healing Boom in Japanese literature"; and "Interdisciplinary Currents". The first section briefly explores attempts to incorporate Western models of scholarship into Japanese literary analysis and critiques of these approaches. "Transnational Feminisms" involves theoretical approaches that resist post-colonial modes of

analysis. The third section explores Saitou Tamaki's contention that recent decades have witnessed a "Trauma and Healing Boom" in modern Japanese literature; this includes writers such as Murakami Haruki and Yoshimoto Banana, for example. The final section of this paper considers the recent trend of studying modern literature alongside popular culture, particularly film, manga and anime.

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## Prof. Mitsuko Okamoto

Director, Graduate School of Film and New Media, Tokyo University of the Arts, Japan

After graduating Kyoto University, she entered NHK.

As a producer, she developed many educational programs, such as 'Digital Stadium', introducing young creators' works, and 'TECHNE', which shows filmmaking techniques.

In 2008, she moved to Tokyo University of the Arts, and in 2013, became the director of its graduate school of Film and New Media.



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### "Animation and Japanese Studies"

**Abstract:** This summer, one big news in Japan was the announce that Studio Ghibli would close. And Hayao Miyazaki has already retired. It seems that one epoch of Japanese animation is ending. On the other hand, media environment is changing rapidly, and a lot of new platforms have appeared for contents distribution. Furthermore, the market has become global. In these days, our issue is to consider how to establish a new Japanese animation.

Tokyo University of the Arts, which is one of the oldest art university in Japan, established its graduate school of cinema and new media in 2005. And it founded its department of animation in 2008. As the only

national school for animation, we are trying to build an educational system, and to develop new ways of expression in animation through a curriculum based on creation. In the presentation, I will introduce you some of our teaching trials and issues.

As a last point, I would like to talk about our new project of creating an international center of Japanese animation. It is based on three guidelines - research, education, archives. It will offer a base for learning and researching on Japanese animation. Since it is presently on planning level, I hope I could get some hints and ideas on that issue through this symposium.

## Prof. Pascal Lefèvre

KU Leuven, Belgium

Pascal Lefèvre is Special Guest Lecturer in the Arts at LUCA, School of Arts (campus Sint-Lukas Brussel) and the Faculty of Arts of KU Leuven (Belgium).

He has published about a hundred publications in 9 different languages, including texts on manga (of which 2 were translated into Japanese). <[sites.google.com/site/lefevrepascal/](http://sites.google.com/site/lefevrepascal/)>



### ***"Why international comparative perspectives are needed in the study of 'national' cultures? The case of manga."***

**Abstract:** Looking at Japanese contemporary culture from abroad may sound 'strange', because how could an outsider give a good idea of something that is experienced every day by people living in a particular culture? In the field of manga, it has been often claimed that only Japanese people will really understand manga. Of course, there will be always aspects of cultural products that will have a more particular meaning for people living in a certain culture at a certain time. On the other hand, however, it is quite evident that even the Japanese popular culture is, at least, tinted by influences from other countries. Not only locate many manga their stories outside Japan,

but more basically, the system of telling stories by means of drawings and texts is widespread. Japan has certainly created specific traditions in the field of graphic narratives that are quite different from other traditions, as, for instance, the American superhero comic, or the French bandes dessinées. I'll argue that the study of Japanese graphic narratives from an international, comparative perspective will both show more clearly in what aspects Japan has been rather singular, and in what aspects manga share characteristics with graphic narratives from other countries.

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Over fifteen years of management experience in Europe and Asia in the creative industry. Held managing positions with international market leaders in the field of live entertainment, contents & intellectual properties, mobile, gaming, TV formats and music. Strong propensity for bringing global perspectives, cultural awareness and innovation to product design and marketing.



### ***"Entertainment industry, cultural/creation industry in the Global Market"***

**Abstract:** Japan is sitting on a treasure of incommensurable dimension. A patrimony of creative ideas, stories, emotions translated into product design, supreme techniques of any sort. In some fields, this excellence has reached the global market, but still most of the treasure remains veiled.

How this gap can be filled? What is actually needed to enhance the connection and open opportunities?

Certainly a number of fixed notions, rules, manners, habits in use on both sides need to be known and understood in order to form a solid foundation and facilitate the mission.

Comparing business models, procedures, policies and above all how to match them can be the first secret weapon needed.

But there is a second secret weapon which can make the difference. When working for many years creating and managing businesses, based on connecting Japanese and western industries (in the field of intellectual properties and contents in my case), a valuable chance arises for a professional. The chance of unlocking a new sight point, a special skill, similar to a mechanical feature largely in use in the movie industry, called "dolly".





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