

**Second International Conference on  
SUSTAINABLE CONSTRUCTION MATERIALS  
AND TECHNOLOGIES**

**June 28 - June 30, 2010  
Ancona, Italy**

**PROCEEDINGS OF SESSIONS IN HONOR OF:**

**DR. ENRICO BORGARELLO  
PROFESSOR THEODORE W. BREMNER  
PROFESSOR DAVID W. FOWLER  
PROFESSOR KONSTANTIN KOVLER  
PROFESSOR KOJI SAKAI**

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## ACKNOWLEDGEMENT

The Organizing Committee for the Second International Conference on Sustainable Construction Materials and Technologies would like to thank the following sponsors and organizations for their support of this conference. Their interest and vision promoting sustainability in the construction industry is acknowledged and sincerely appreciated.

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RILEM, France  
UWM Center for By-Products Utilization, Milwaukee, Wisconsin, USA  
Coventry University, Coventry, U.K



## **PREFACE**

The Second International Conference on Sustainable Construction Materials and Technologies was held from June 28 to June 30, 2010, in Ancona, Italy. The conference goal was to highlight case studies and research on new and innovative ways to achieve sustainable construction practices through use of novel construction materials and technologies. Over 350 abstracts from 50 countries were submitted for consideration for presentation and publication at the conference. After the selection of abstracts, over 250 manuscripts were received. These and other invited papers were presented at many technical sessions in Ancona. This publication contains a record of the papers selected for presentation at the conference for five special sessions held for honorees.

Session in honor of Dr. Enrico Borgarello

Session in honor of Professor Theodore W. Bremner

Session in honor of Professor David W. Fowler

Session in honor of Professor Konstantin Kovler

Session in honor of Professor Koji Sakai

The editors, members of the Organizing Committee, Technical Committee, and International Advisory Committee wish to thank the authors, session chairs, and the honorees of each special session for their contribution. These contributions for furthering sustainability in construction through this book are acknowledged. The manuscripts printed in this book are being published without detailed reviews. The authors are encouraged to publish these papers in the technical journals of the American Society of Civil Engineers, Institution of Civil Engineers, American Concrete Institute, or other technical journals of their choice.

Editors: Tarun R. Naik, Fethullah Canpolat, Peter Claisse, and Eshmaiel Ganjian

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SPECIAL SESSIONS

SESSION IN HONOR OF DR. ENRICO BORGARELLO



### **Biographical Sketch of Dr. Enrico Borgarello**

Dr. Enrico Borgarello received his degree in Chemistry at the University of Torino in 1980, under the supervision of Prof. Ezio Pelizzetti. His thesis was focused on chemical and physical systems to convert solar energy into hydrogen and in particular the use of organized systems, such as micelles, emulsions, micro emulsions, and colloidal dispersions in oil and water to enhance the efficiency of the reactions.

During his scientific and managerial career he received several honours from Italian and German Institutions, as the Lorgna Award for Alternative Energies from the Italian Academy of Science in 1981, the Steinkopff Award in 1997 from the German Chemical Society, and the Sapio Award in 2006 for his research on colloid science. In 1990 he was appointed Eni Senior Scientist.

Since 2005 he is the Director of Research & Development in the Italcementi Group Technical Center, Bergamo, Italy where he manages one of the largest industrial research centers on cements and concrete in the world. Today his research group is very focused on innovative products and processes, with a strong commitment to CO<sub>2</sub> reduction, low energy consumption, the best water resources management, and sustainable development.

From 1986 to 2005 he was at Eni, where he covered several positions, from Senior Researcher to R&D Manager in Exploration and Production of oil and gas. During these 19 years of research, the main areas of investigations were related to the application of colloid science to the production and transportation of oil and gas.

From 1980 to 1986 he was Research Associate at several Universities, first at Ecole Polytechnique Fédérale of Lausanne, under the supervision of Prof. Michael Graetzel, then at Concordia University in Montreal working with Prof. Nick Serpone, at Argonne National Laboratories in Chicago with Prof. Daniel Meisel, and finally at Ecole Centrale de Lyon with Dr. Pierre Pichat. In these six years of academic research he worked on the application of photocatalysis for the production of hydrogen from water and to the degradation of pollutants in water.

He has published more than 80 papers and has contributed to the realization of 25 patents in the area of applied colloid science. His present expertise is in the management of R&D with particular attention to the deployment of technologies and new products.

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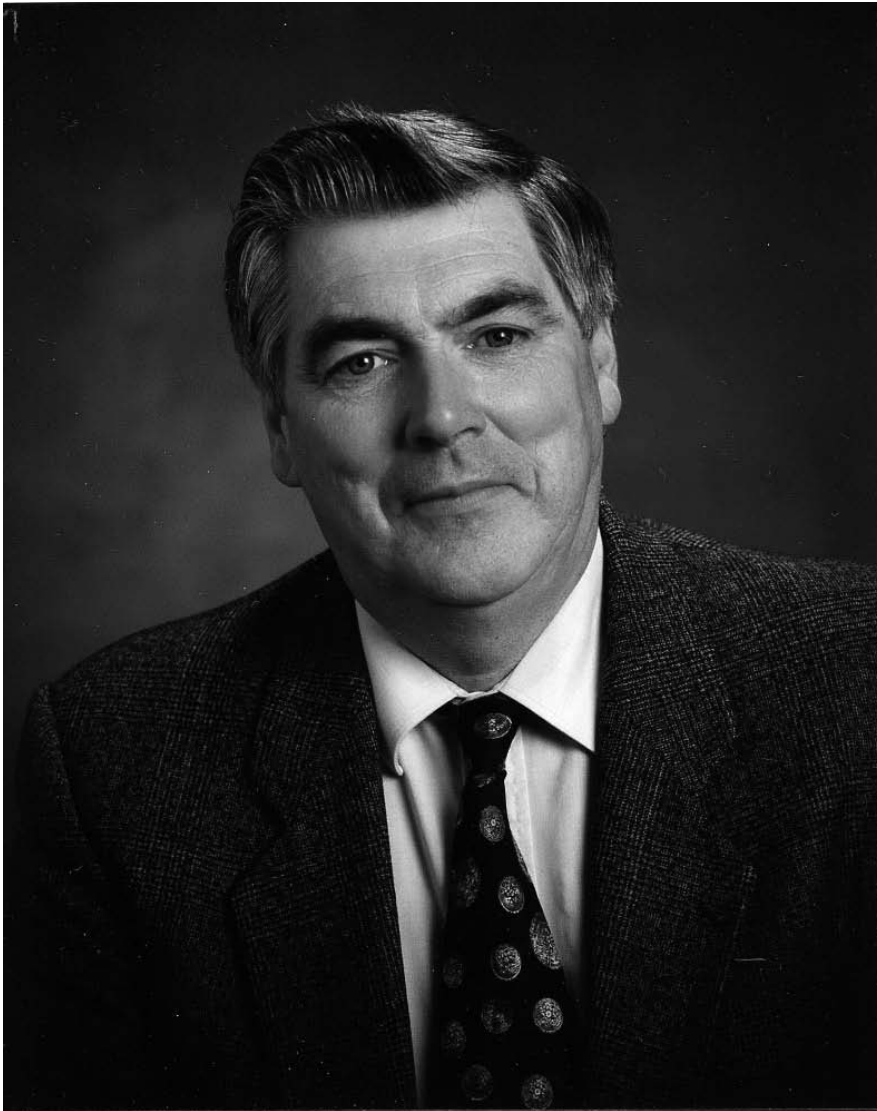
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**SESSION IN HONOR OF PROFESSOR THEODORE W. BREMNER**



### **Biographical Sketch of Professor Theodore (Ted) W. Bremner**

Professor Bremner received his B.Sc. in civil engineering from the University of New Brunswick in 1960, M.Sc. from Imperial College and Ph.D. from the University of London, UK.

Professor Bremner is an Emeritus and Honorary Research Professor, Department of Civil Engineering, University of New Brunswick, Fredericton, New Brunswick, Canada. He is a Fellow of the American Concrete Institute (ACI) and a member of several of its technical committees, including Chairman of ACI Committee 213 Lightweight Aggregate and Concrete, 1993-1999. He was the president of the Atlantic Chapter of the American Concrete Institute, 1975-1976. He is a member for the Organization of CANMET/ACI International Conferences (ACI Council) and a founding member of the CANMET Conference Organizing Committee (1988-present) involved in organizing over 50 conferences with an attendance of over 8,000 attendees world-wide. He is a Fellow of the Canadian Society of Civil Engineers, a member of the Metric Commission of Canada, Canadian Standards Association, and Federation Internationale de la Precontrainte (FIP); and, a Life Member of Association of Professional Engineers and Geoscientists of New Brunswick, RILEM.

Professor Bremner was a Principal Researcher at the Marine Concrete at the US Corps of Engineers, Treat Island, Maine Exposure Site, USA. His overall research work has culminated in over 170 refereed papers and over 120 reports. Also, two patents have been issued to him on the use of high purity lignin as a high-range water reducing admixture for concrete.

Professor Bremner has received many awards and recognitions from Canada, Mexico, and USA. He received ACI Cedric Wilson Award, 1988; Canadian - USSR Academic and Scientific Exchange Award for Senior Scholars and Specialists in 1988 and 1992; and, ACI Construction Practice Award, 1990. He also received an award for sustained and significant contributions to the success of CANMET/ACI International conferences on Concrete Technology, 1991; a medal from Instituto Mexico del Cemento y del Concreto; and, Frank G. Erskine Award for outstanding contribution by the Expanded Shale, Clay and Slate Institute, 1997. He was invited to join an international panel of experts to present a series of lectures on "Cement and Concrete Technology for Sustainable Development" in Beijing, Shenyang, and Jinan, China, in October 2008.

Professor Bremner's research areas include the study of concrete in sea water; the microstructure and performance of concrete; the strength and durability of lightweight concrete; alkali-aggregate reactions, the performance of reinforced and prestressed concrete in corrosive environments; the use of high purity lignin as a superplasticizer for concrete; the use of magnetic resonance imaging to study moisture distribution in normal and low density concretes; strain and temperature measurement in concrete structures using distributed fibre optic sensing based on Brillouin scattering; and, the study of specified density concrete.

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**SESSION IN HONOR OF PROFESSOR DAVID W. FOWLER**



### **Biographical Sketch of Professor David W. Fowler**

Professor Fowler holds B.S. and M.S. degrees in Architectural Engineering from the University of Texas at Austin and a Ph.D. in Civil Engineering from the University of Colorado at Boulder. He is a registered professional engineer in Texas. He was assistant professor (1964-69), associate professor (1969-75), and professor (1975-present), at the University of Texas in the Department of Civil, Architectural and Environmental Engineering. He was named the T. U. Taylor Professor in 1980 and was appointed to the Joe J. King Chair in Engineering No. 2, 1998.

Dr. Fowler has taught a wide range of courses at the undergraduate and graduate level: construction materials, design of reinforced concrete structures, structural analysis, advanced construction materials, design of building components, forensic engineering, and repair of concrete. He has been awarded many teaching awards including the outstanding teacher award in the College of Engineering and the outstanding teaching award for the University. He is a member of the UT Academy of Distinguished Teachers and a Distinguished University Teaching Professor.

Dr. Fowler has been involved in research for over 40 years. For many years he had the largest university research program on concrete-polymer materials. He has conducted research on polymer concrete (and other concretes) for repair of bridges, pavements, and bomb-damaged runways, repair of cracks using polymers, bridge and floor overlays, and for precast components. Dr. Fowler served as the principal investigator, and is the current director, of the research project that established the International Center for Aggregates Research funded by the aggregates industry. He has lectured extensively in the U.S. and internationally on his research and has published several hundred papers and reports.

Dr. Fowler has been active in many technical and professional societies. He has served on the Board of Directors of the ACI and is past chair of the ACI Concrete Research Council, Concrete Research and Education Foundation, and Committees on Polymers and Adhesives in Concrete, and Convention Training. He has also served on numerous other committees of ACI, TRB, ASCE, and RILEM. He also serves on the publications committee of the Architectural Engineering Institute. He was the first president of the International Congress on Polymers in Concrete and is currently on its Board of Directors.

Dr. Fowler has been the recipient of many awards including the ACI Delmar Bloem Award and the Robert Philleo Award. He is a Fellow in the American Concrete Institute, the American Society of Civil Engineers, and the Architectural Engineering Institute. He was named an honorary member of the Russian Academy of Engineering in 1992. In 1993 he was named a Distinguished Engineering Alumnus of The University of Colorado at Boulder. In 1995 he received the Owen Nutt Award for distinguished service and leadership in the field of polymers in concrete from the International Congress on Polymers in Concrete. He was inducted into the National Academy of Engineering in 1998 for his work in the "development and application of concrete-polymer materials." He received the College of Engineering Joe J. King Distinguished Centennial Award in 2001 and the Billy and Claude R. Hocott Centennial Distinguished Engineering Award in 2002.

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### **Biographical Sketch of Professor Konstantin Kovler**

Dr. Kovler received his M. Sc. (*summa cum laude*) in Industrial and Civil Construction, State University of Civil Engineering, Moscow, Russian Federation (1978) and his Ph. D. in Structural Engineering in the same university (1986).

In 1978-1986 he was employed as a Research Fellow in the State University of Civil Engineering, Moscow. After his Ph. D., he worked as a Senior Research Fellow at P. Budnikov Research Institute of Building Materials and Structures, Moscow. In 1989-1990 he worked as Docent in the Department of Building Structures, State Polytechnic University, Moscow. Since 1991 he works at the Technion – Israel Institute of Technology, Haifa, as a Research Fellow of the National Building Research Institute. Since 1996 he is also a Faculty Member in the Faculty of Civil and Environmental Engineering and Associate Professor since 2002. He was appointed as Head of the Building Materials and Technology Department of the institute in 2005.

Dr. Kovler's contribution in teaching and research has been well recognized nationally and internationally. He teaches numerous graduate and undergraduate courses. In the past he has given lectures on Concrete Technology and Quality Control and Quality Assurance in Construction in the framework of academic program "Continuing Education and External Studies". He has contributed in organizing and teaching several Ph. D. Courses in Denmark and China, and presented invited lectures in Brazil, Canada, USA, Denmark, Germany, Japan, Russian Federation, Korea, China, Czech Republic, Slovakia, and Israel.

The research interests of Dr. Kovler include high-performance concrete, shrinkage and creep, uses of gypsum, pozzolanic materials and industrial by-products in construction, advanced and environmentally-friendly technologies in quarrying and construction, radioactivity of building materials, and radon mitigation. He has published 20 books and book chapters, 70 papers in peer-refereed scientific journals, 50 papers in refereed conference proceedings, 4 patents, 40 research reports, and more than 50 other publications.

Dr. Kovler serves as a member of the Expert Committee of the National Coal Ash Board and numerous technical committees of Israeli Institute of Standards and the Association of Civil and Infrastructures Engineers in Israel. He is also a member of the Editorial Board of the National Journal "Civil Engineering and Infrastructures".

Dr. Kovler is active in two international associations, RILEM and ACI. He is Fellow of RILEM, Convener of RILEM Cluster B "Materials Characterization, Properties Evaluation and Processing" and Member of RILEM Technical Activities Committee (TAC).

Dr. Kovler is an Associate Editor of the RILEM Journal Materials and Structures and a member of Editorial Board of the Journal Cement and Concrete Composites. He has also served as a Guest Editor of Special Issues of the journals Interface Science and Cement and Concrete Composites. He was an organizer of the First and Second International RILEM Workshops on Concrete Durability and Service Life Planning (ConcreteLife'06 and ConcreteLife'09), which received a wide international resonance and attracted leading experts working with concrete and concrete structures.



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### **Biographical Sketch of Professor Koji Sakai**

Dr. Sakai received his Bachelor of Engineering degree in Civil Engineering from the Kitami Institute of Technology, Kitami, Japan, in 1972. He received his M.E. and Dr. Eng. Degrees from Hokkaido University, Sapporo, Japan, in 1973 and 1985, respectively. From 1973 to 1988, Dr. Sakai was employed as a research associate and associate professor in Faculty of Engineering at Hokkaido University. Dr. Sakai worked at the University of Canterbury, Christchurch, NZ, from 1985 to 1986 and the University of Houston, Texas, USA, from 1986 to 1987 as an invited research associate. From 1988 to 1998, Dr. Sakai worked at Civil Engineering Research Institute, Hokkaido Development Bureau, Sapporo, Japan, as the head of materials section and director of structural division. In 1998, Dr. Sakai joined Kagawa University as a professor of the faculty of Engineering, where he currently serves as a Professor in the Department of Safety Systems Construction Engineering. Dr. Sakai served as the vice-dean of the Faculty of Engineering at Kagawa University from 1999 to 2002 and as a senator of Kagawa University from 1999 to 2004.

Dr. Sakai has published numerous papers and technical articles that include more than 110 refereed papers, more than 70 international conference papers, and others (total more than 300). He has published two general books on concrete durability and aesthetics, two workshop proceedings, and five International Conference CONSEC proceedings. He has had many research grants from private industries and governments in Japan.

Dr. Sakai is a member of ACI, JCI, JSCE, RILEM, FIB, LCAJ, and JSDE. He has been the president of JCI Shikoku Chapter since 2003. He has chaired FIB Commission 3 on environmental aspects of design and construction since 2002, the ISO/TC71/SC8 on environmental management for concrete and concrete structures since 2008, and the JCI committee on minimization of global warming substances and wastes in the concrete sector since 2008. He published the JSCE Recommendation of Environmental Performance Verification for Concrete Structures. He is a member of ACI Board Advisory Committee on Sustainable Developments and Committee 130 on Sustainability of Concrete.

Dr. Sakai has received several awards. They include the JSCE Yoshida Prize in 1997, JCI Meritorious Deed Prize in 2005, and the CANMET/ACI Award, in 2006.

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