

2ND MC3 TOKYO

2nd International Conference
on Mineral Carbonation
for Cement and Concrete

September 28-30, Tokyo, Japan

Venue: The University of Tokyo



Organized by Japan Concrete Institute

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Here's the conference
website!



Welcome Message

Conference Chair
Prof. Ippei MARUYAMA
(the University of Tokyo)



The world is in a state of turbulence, with society facing complex scientific and technological challenges alongside pressing geopolitical and political issues. Consequently, the demands placed on technological development within the construction sector have become increasingly diverse.

Global natural disasters—including earthquakes, tsunamis, wildfires, torrential rains, floods, and landslides—alongside broader environmental shifts, starkly highlight the critical need for more resilient infrastructure. At the same time, public awareness has sharpened regarding the impact of human activities on the natural environment, which are widely recognized as key drivers of these changes.

In this context, the concrete sector—traditionally a major consumer of natural resources—urgently needs to transition toward a circular economy, maximize the effective utilization of industrial by-products, and substantially reduce CO₂ emissions. Achieving these goals requires profound transformation across the entire industry.

Within this framework, mineralization technologies utilizing gaseous or atmospheric CO₂ are increasingly recognized for their versatility—whether in facilitating component separation in waste materials, imparting reactivity, or enabling permanent carbon sequestration. As a result, extensive technological development is progressing rapidly worldwide.

The 1st RILEM International Conference on Mineral Carbonation for Cement and Concrete (supported by RILEM TC MCP : Accelerated Mineral Carbonation for the production of construction materials) was successfully held on April 16–17, 2024, in Aachen, Germany. The inaugural event highlighted state-of-the-art technologies while clarifying underlying scientific and engineering challenges and future perspectives. Driven by a strong consensus among participants to host a follow-up conference, the group decided to hold the second edition at the University of Tokyo, with support from the Japan Concrete Institute.

This conference places high value on fostering deep, focused discussions on specific topics related to mineralization, intentionally avoiding the multi-track, parallel-session format typical of many international conferences. To maintain this single-track approach while allowing sufficient time for rigorous debate, the conference duration has been extended from two days to three. We anticipate welcoming over 180 participants representing a wide range of countries.

In Japan, mineralization is recognized as a vital technology that receives substantial government support, encouraging broad participation from the domestic research and industrial communities.

We hope this conference will clarify the state of the art, future outlooks, and key scientific and engineering challenges remaining in the field. Ultimately, we trust that these insights will promote the effective utilization of mineralization technologies, accelerating the industry's path toward carbon neutrality, reduced emissions, and a circular economy.

Operating Organization

Organizers

- Organized by** Japan Concrete Institute
- Sponsored by** Mitsubishi UBE Cement Corporation
 TAIHEIYO CEMENT CORPORATION
 Sumitomo Osaka Cement Co., Ltd.
 CUCO
 HAZAMA ANDO CORPORATION
- Supported by** RILEM & ACI

Organization Committees

Conference Chair

Prof. MARUYAMA, Ippei (the University of Tokyo)

Advisory Committee

Prof. MATSCHEI, Thomas (Rheinisch-Westfälische Technische Hochschule)
 Prof. SNELLINGS, Ruben (Katholieke Universiteit Leuven)
 Assist. Prof. GEORGET, Fabien Jacques Michel (Université de Sherbrooke)

Local Committee

Prof. MARUYAMA, Ippei (Chair, the University of Tokyo)
 Prof. ELAKNESWARAN, Yogarajah (Chief secretary, Hokkaido University)
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 Dr. SUDA, Yuya (Co-chair, Niigata University)
 Dr. SAITO, Tsuyoshi (Secretary, the University of Tokyo)
 Dr. IGARASHI, Go (Nagoya University)
 Dr. WANG, Wei (Southeast University)
 Dr. OHKUBO, Takahiro (Chiba University)
 Dr. TERAMOTO, Atsushi (Kyoto University)
 Dr. TAKAHASHI, Haruka (Taiheiyo Cement Co., Ltd.)
 Dr. WATANABE, Kenzo (Kajima Corporation)

Operating Organization

Scientific Committee

Prof. Alisa Machner, Technical University of Munich (TUM)

Assist. Prof. Arezou Ahmadi, Chalmers University of Technology

Assoc. Prof. Atsushi Teramoto, Kyoto University

Prof. Burkan Isgor, Oregon State University

Assist.Prof. Cédric Patapy, University of Toulouse (LMDC)

Assist. Prof. Fabien Georget, Université de Sherbrooke

Dr. Frank Winnefeld, Swiss Federal Laboratories for Materials Science and Technology (Empa)

Prof. Gaurav Sant, University of California, Los Angeles (UCLA)

Dr. Giuseppe Ferrara, The Polytechnic University of Turin

Assoc. Prof. Go Igarashi, Nagoya Univeristy

Prof. Guang Ye, Delft University of Technology (TU Delft)

Prof. Hegoi Manzano, University of the Basque Country (UPV/EHU)

Prof. Ippei Maruyama, The University of Tokyo

Dr. Maciej Zajac, Heidelberg Materials

Assoc. Prof. Prannoy Suraneni, University of Miami

Prof. Ruben Snellings, Katholieke Universiteit Leuven

Prof. Ryoma Kitagaki, Hokkaido University

Assoc. Prof. Takahiro Ohkubo, Chiba University

Prof. Thomas Matschei, RWTH Aachen University

Prof. Tsuyoshi Saito, The University of Tokyo

Prof. Tung-Chai Ling, Jinan University

Prof. Wang Wei, Southeast University

Prof. Yogarajah Elakneswaran, Hokkaido University

Dr. Yury Villagran, VITO

Assoc. Prof. Yuya Suda, Niigata University

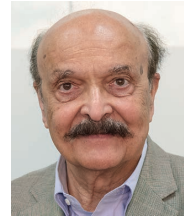
Dr. Zhidong Zhang, ETH Zurich

Plenary Speakers

Carbon Conscious Concrete and Global Warming Potential

Prof. Surendra P Shah

Dr. Surendra Shah is distinguished for his seminal research on synthesizing engineering mechanics and material science. Professor Shah has made unique, original and extensive contributions to better understand and define properties of cement-based materials and developing new advanced materials which has become a world standard in these fields. He is responsible for developing high performance concrete, fibre reinforced concrete, self-consolidating concrete, shrinkage reducing admixtures, carbon nano-tube reinforced cement based composites and extrusion processing of concrete. These have revolutionized the way modern concretes are used worldwide. Dr. Shah has been recognized with many awards and honors, notably he is a member of the National Academy of Inventors, National Academy of Engineering, Academy of Athens, Chinese Academy of Engineering, Indian Academy of Engineering, German Academy of Engineering and the Russian Academy of Engineering. He is Walter P Murphy Emeritus Professor at Northwestern University, where he was the director of pioneering NSF funded Science and technology Centre on Advanced Cement based Materials.



Mineral carbonation hardening – niche or mainstream?

Prof. Ruben Snellings

Ruben Snellings is an associate research professor at KU Leuven, Belgium. He earned a PhD in geology at KU Leuven on the pozzolanic reactivity of natural zeolites. After his PhD, he was a postdoctoral researcher at UGent (Belgium) and a Marie Curie Fellow at EPFL (Switzerland), specialising in Xray diffraction and electron microscopy of supplementary cementitious materials. He then worked eight years at VITO as senior researcher before returning to KU Leuven. In 2016 he received the RILEM Gustavo Colonnetti Medal. He currently leads the Applied Mineralogy group at KU Leuven, focusing on sustainable and innovative construction materials using primary and secondary resources as well as mineral carbonation technologies.



Ambient carbonation

Prof. Gaurav Sant

Gaurav is a Professor and the Pritzker Endowed Chair in Sustainability at the Samueli School of Engineering at the University of California, Los Angeles (UCLA). He has published over 225 peer-reviewed journal publications and has an h-index of 68. He is the Director of UCLA's Institute for Carbon Management (ICM) : a cross-campus technology translation institute. He is the CTO/Co-Founder of Equatic Inc., the Grand Prize Winner of the Temasek Foundation's 2021 Liveability Challenge, the Co-Founder of Concrete-AI Inc., the Co-Founder of Nextli Technologies Inc., and the Founder of CarbonBuilt Inc., a Grand Prize Winner of the 2021 NRG COSIA Carbon XPRIZE. He has served as an expert providing : a) testimony to the U.S. Senate, U.S. House of Representatives, and the California State Senate, and b) strategic consulting, core R&D, and innovation support to Fortune500 corporations, government agencies, foundations, and industry organizations globally. He earned his B.S. (2006), M.S. (2007), and Ph.D. (2009) from Purdue University. He is a Fellow of the American Concrete Institute, the American Ceramic Society, and the U.S. National Academy of Inventors (NAI).



Plenary Speakers

Atomic-scale insights into nucleation pathways of calcium carbonate in cementitious environments

Prof. Hegoi Manzano

Hegoi Manzano obtained his PhD in Physical Chemistry from the University of the Basque Country (UPV/EHU) in 2010, after completing an industrial PhD at TECNALIA, a research and development organization. His doctoral thesis focused on the atomistic modelling of cement-related materials. He subsequently joined the Massachusetts Institute of Technology (MIT) as a postdoctoral researcher for two years, where he worked on the development of reactive force fields and their application to cementitious materials. In 2012 he returned to the UPV/EHU, where he held several postdoctoral positions until 2015, including a Juan de la Cierva fellowship. In that year he obtained a position as Assistant Professor in the Department of Physics at the Faculty of Science and Technology, UPV/EHU, where he is currently a Permanent Professor. At UPV/EHU, Hegoi Manzano leads a research group dedicated to atomic and mesoscale modelling of cement-related materials, an area in which the group has become an international reference. He has published more than 100 articles accumulating more than 6,300 citations, with an h-index of 40. He is a member of the Transnational Laboratory "Aquitaine-Euskadi Network in Green Concrete and Cement-based Materials" (LTC-Green Concrete) and of the RILEM association, and since 2021 he has served as editor of the journal Cement and Concrete Research. He has supervised 30 Bachelor's theses, 5 Master's theses, and 7 PhD dissertations. He is currently a member of the Faculty Board of the Faculty of Science and Technology and a member of the UPV/EHU Degree Studies Committee.



Net Zero Concrete

Prof. POON Chi Sun

Prof. Poon obtained his PhD from Imperial College London. He is currently a chair professor and director of the Research Centre for Environmental Technology and Management at the Civil and Environmental Engineering Department. He has been a Changjiang Scholar Chair Professor since 2017. Prof. Poon specializes in the research and development of low-carbon construction materials, waste management, waste recycling technologies, and sustainable construction. He has published over 500 papers in international journals. He is a fellow of the Hong Kong Institution of Engineers (HKIE), past chairman of the HKIE Environmental Division and past representative of the HKIE Environmental Discipline. He is also a Hong Kong Concrete Institute (HKCI) fellow and was its president. He has served on the Advisory Council on the Environment (ACE) and the Council for Sustainable Development and is currently a member of the advisory committee for the Recycling Fund of the Hong Kong SAR Government.



Net Zero Concrete

Prof. Tung-Chai (Bill) LING

Prof. Tung-Chai (Bill) LING is a professor from Jinan University, specializing in solid wastes utilization and carbon sequestration technologies in the field of construction materials. He has presided over 20 competitive research projects, including NSFC's Research Fund for International Senior Scientists, and published more than 200 SCI journal papers with over 20,000 citations and an h-index of 80. He has also been elected as a Fellow of the ASEAN Academy of Engineering and Technology (AAET), and was awarded the "Robert L'Hermite Medal" by RILEM in 2020.



Plenary Speakers

CaCO₃ Crystallization Pathways at Interfaces: Rethinking Cement Carbonation

Prof. Alejandro Fernandez-Martinez

Alejandro Fernández-Martínez is a CNRS Research Scientist at ISTerre (Grenoble, France), working at the interface of geochemistry, mineralogy, and materials science. His research focuses on the mechanisms controlling mineral nucleation, growth, and reactivity at the nanoscale, with particular emphasis on carbonate formation and CO₂ mineralization in cementitious systems. He has expertise on the use of synchrotron X-rays and neutron scattering to probe nanoscale mechanisms underlying environmental and crystallization processes. He has made key contributions to the understanding of non-classical nucleation pathways, metastable precursors, and interfacial processes under controlled humidity conditions. He has authored over 100 peer-reviewed publications (h-index 41), co-supervised over 15 PhD students and 7 postdocs. He received the CNRS Bronze Medal in 2021.



Synergistic Hydration of Carbonated Recycled Concrete Paste and Conventional SCMs in Composite Cements

Dr. Maciej Zajac

Maciej Zajac is Team Leader Scientific Coordination at Heidelberg Materials Global R&D in Leimen. His research focuses on the new technologies for cement and concrete, including hydration mechanisms, supplementary cementitious materials, carbonation, concrete recycling and alternative methods of cement production. He combines fundamental materials science with industrial implementation and standardization.



Doctoral School Lecturers

Basics of carbonation of concrete

Prof. Ippei Maruyama

Mineralization and carbonation hardening are fundamentally governed by the same underlying mechanisms as the carbonation of concrete, a phenomenon that has long been studied in the context of concrete durability. This lecture aims to revisit the historical development of research on concrete carbonation and neutralization, provide an overview of recent advances in the field, and present a comprehensive perspective on the fundamental mechanisms that underpin a wide range of emerging technologies.

Particular emphasis will be placed on the coupled transport of moisture and CO₂ within porous cementitious materials and the resulting carbonation processes. Through selected examples from both fundamental and applied research, the lecture will introduce recent findings that have advanced our understanding of these coupled physicochemical phenomena and discuss how this knowledge serves as the scientific foundation for the development of mineralization technologies and carbonation hardening.



Hydration and Carbonation of Modern Cements – A Thermodynamic Perspective

Prof. Thomas Matschei

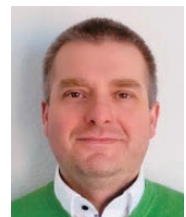
Thomas Matschei is Professor of Construction Materials and head of the Building Materials Division at the Institute for Building Materials, Concrete Structures and Fire Safety (iBMB). After earning his PhD in cement chemistry from the University of Aberdeen in 2008, he held key industry R&D roles and professorships at HTW Dresden and RWTH Aachen. His research focuses on sustainable, low-carbon binders and mineral carbonation, co-chairing RILEM TC 309.



Carbonation Hardening of Cementitious Materials : Mechanisms, Performance and Industrial Boundaries

Dr. Maciej Zajac

Dr. Maciej Zajac is Team Leader Scientific Coordination at Heidelberg Materials Global R&D in Leimen. His research focuses on the new technologies for cement and concrete, including hydration mechanisms, supplementary cementitious materials, carbonation, concrete recycling and alternative methods of cement production. He combines fundamental materials science with industrial implementation and standardization.



Doctoral School Lecturers

Atomistic Modeling of Cementitious Materials : From Classical to Machine-Learning Interatomic Potentials

Dr. Takahiro Ohkubo

Dr. Takahiro Ohkubo is an Associate Professor at Chiba University. His expertise includes NMR spectroscopy, DFT calculations, and MD simulations. His research focuses on disordered and poorly crystalline materials, such as glasses and clay minerals. In recent years, He has been applying atomistic simulations to carbonation-related processes in cementitious materials.



Application of ^1H NMR relaxometry on cement-based materials : From Basic to Current Perspectives

Dr. Ryo Kurihara

Dr. Ryo Kurihara is an Assistant Professor at the University of Tokyo. His research expertise lies in the microstructural characterization of cementitious materials, focusing on their structural evolution in response to hydration, drying/wetting and carbonation processes. Since his PhD studies, he has applied ^1H NMR relaxometry techniques to investigate the pore structures and moisture dynamics of cement-based materials.



General information

Conference Date

Mon 28 – Wed 30 September, 2026

Welcome Reception: Sun 27 September, 2026 (Starting at 6:00 pm)

Conference Venue

Takeda Frontier Science Hall (Takeda Hall) 5F

the University of Tokyo, Asano Campus 2-11-16, Yayoi, Bunkyo-ku, Tokyo, Japan

Registration

There will be no on-site registration this time.

Registration Desk

It will be set up in the foyer on the 5th floor of Takeda Frontier Science Hall (Takeda Hall).

September 27th (Sun) 5:00 pm–7:00 pm

September 28th (Mon) 8:30 am–6:00 pm

September 29th (Tue) 8:00 am–5:00 pm

September 30th (Wed) 8:00 am–4:00 pm

Coffee Break

Coffee, tea, water, and light snacks will be available.

Please feel free to use the water bottle we gave you as a souvenir.

***No eating and drinking in the Takeda Hall except in the foyer.**

Monday, 28 September	11:00–11:30 am / 4:00 pm–4:30 pm
Tuesday, 29 September	10:00–10:30 am / 3:30 pm–4:00 pm
Wednesday, 30 September	10:00–10:30 am / 3:50 pm–4:20 pm

Lunch

It will be held at two different venues. The venue is listed on your registration card.

①HASEKO-KUMA HALL Lounge 1F・2F ②Faculty of Engineering Bldg.2, Exhibition Room213

Monday, 28 September	12:30 pm–2:00 pm
Tuesday, 29 September	11:40 am–1:30 pm
Wednesday, 30 September	12:00 pm–1:50 pm

Internet

We are pleased to offer two types of Wi-Fi below in the venue.

1) eduroam

If you belong to a university or research institute that participates in eduroam, you can use eduroam on the University of Tokyo campus.

2) UTokyo-Guest

This Wi-Fi account is for guests.

This service is provided by SoftBank and requires registration using a mobile phone. Please refer to the QR code for details on how to connect.



Restroom

Restrooms are located on the 1F and 4F.

*The conference venue is on the 5F.

Garbage

Please take your garbage with you.

Garbage from the food and drinks served at the conference will be collected.

Social Events

Welcome Reception

Sun 27 September, Starts at 6:00 p.m.

Venue: **Takeda Frontier Science Hall (Takeda Hall)**,

the University of Tokyo, Asano Campus 2-11-16, Yayoi, Bunkyo-ku, Tokyo, Japan

Conference Dinner (Banquet)

Tue 29 September, 7:00 p.m. to 9:00 p.m.

*The reception desk opens at 6:00 p.m.

Venue: **Hotel Chinzanso Tokyo** (ホテル椿山荘東京)

10-8, Sekiguchi 2-chome, Bunkyo-ku, 112-8680 Tokyo, Japan

Main Venue

①Takeda Frontier Science Hall (Takeda Hall)

the University of Tokyo, Asano Campus 2-11-16, Yayoi, Bunkyo-ku, Tokyo, Japan

►For Main Conference / Welcome Reception



Takeda Hall

Lunch Venue

The lunch venues are divided into two locations.

Please check the name tag you receive at the registration desk to find out which venue you are assigned to.

②HASEKO-KUMA HALL Lounge 1F・2F (Lunch Hall A)

the University of Tokyo, Hongo Campus, 7-3-1, Hongo, Bunkyo-ku, Tokyo, Japan

③Faculty of Engineering Bldg.2, Exhibition Room213, (Lunch Hall B)

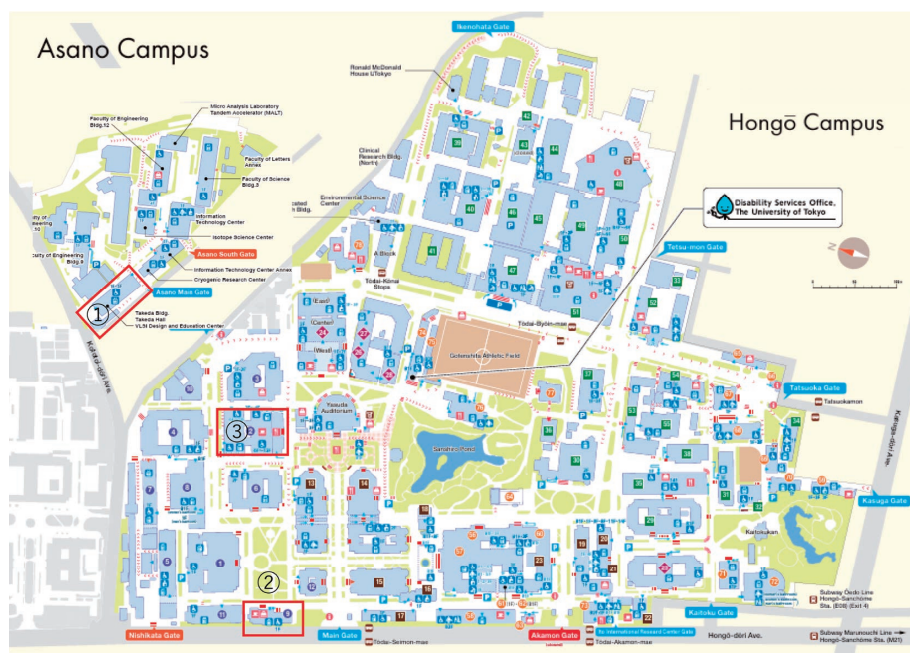
the University of Tokyo, Hongo Campus, 7-3-1, Hongo, Bunkyo-ku, Tokyo, Japan



Lunch Hall A



Lunch Hall B



Banquet Venue

Hotel Chinzanso Tokyo

10-8, Sekiguchi 2-chome, Bunkyo-ku, 112-8680 Tokyo, Japan

Venue: **Ballroom**, 1st Floor of the Hotel Building

The front desk (entrance) is on the 3rd floor, so please take the elevator to the 1st floor.

Hotel Chinzanso Tokyo offers a luxurious sanctuary in the heart of Japan's bustling capital, seamlessly blending centuries of history with world-class hospitality. The absolute crown jewel of this historic estate is the *Tokyo Unkai* (Tokyo Sea of Clouds)—a breathtaking, immersive phenomenon where the hotel's expansive Japanese garden is enveloped in a mystical mist.

"Tokyo Sea of Clouds" –YAKUMO–

On the 29th, the show will begin at forty every hour.

5mins for each show.

Please scan the QR code for more details!



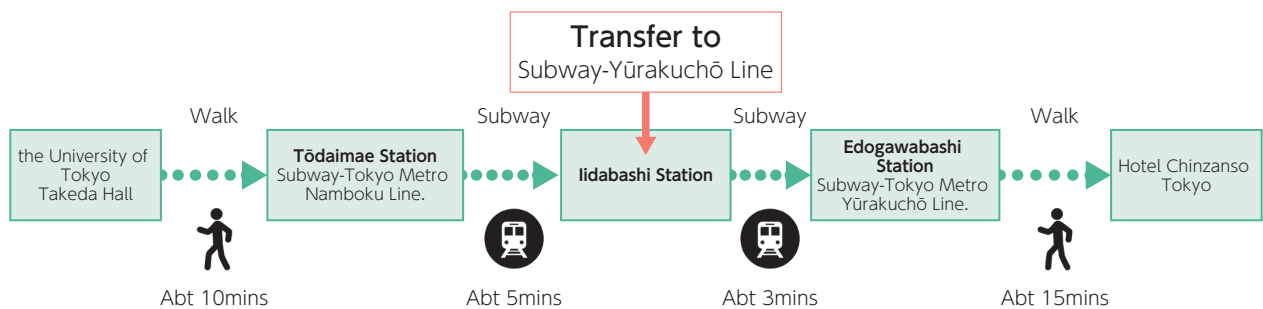
GARDEN MAP



Tokyo Sea of Clouds



Map and Directions



Scan here for directions
to the venue!



About 10 minutes by foot from Edogawabashi Station (Exit 1a) on the Yurakucho Line (Tokyo Metro)

- From Exit 1a, cross the Kanda River on the Edogawabashi Bridge.
- Go about 30 meters beyond the bridge and turn left at the first signal (a greengrocer is on the corner).
- Continue up the road for about 500 meters.

The Kabukimon Gate is closed. The Kandagawa River Gate, located along the Kandagawa River, is available for access to the hotel entrance.

<Opening hours 6:00 a.m. to 10:00 p.m.>

*This entrance has a steep slope. Please use the main entrance if you need wheelchair access or have heavy luggage.

Program at a Glance

*The numbers in parentheses () indicate the number of presentations in each session.

	Day 1 27 September Sun.	Day 2 28 September Mon.	Day 3 29 September Tue.	Day 4 30 September Wed.
AM 8:00				
8:30				
9:00		Welcome address	Oral Full Session OF-3 (6)	Oral Full Session OF-6 (6)
9:30		Plenary Lecture-1		
10:00	Doctoral school	Plenary Lecture-2	Coffee break	Coffee break
10:30	Engineering Building #11 (HASEKO-KUMA Hall)	Plenary Lecture-3	Oral Short Session OS-2 (10) *Until 11:40am	Oral Short Session OS-3 (12)
11:00		Coffee break		
11:30		Oral Full Session OF-1 (4)	Lunch A:HASEKO-KUMA HALL Lounge B:Faculty of Engineering Bldg.2, Exhibition Room213	Lunch *Until 1:50pm A:HASEKO-KUMA HALL Lounge B:Faculty of Engineering Bldg.2, Exhibition Room213
12:00	Lunch	Lunch A:HASEKO-KUMA HALL Lounge B:Faculty of Engineering Bldg.2, Exhibition Room213	Plenary Lecture-4	
12:30			Plenary Lecture-5	Plenary Lecture-6 *Start from 1:50pm
PM 1:00		Oral Full Session OF-2 (8)	Oral Full Session OF-4 (4)	Plenary Lecture-7 *Start from 2:20pm
1:30	Doctoral school		Coffee break	Oral Full Session OF-7 (4) *Start from 2:50pm
2:00	Engineering Building #11 (HASEKO-KUMA Hall)	Coffee break	Oral Full Session OF-5 (4)	Coffee break *3:50pm-4:20pm
2:30				
3:00		Oral Short Session OS-1 (12)	Move to Banquet Venue	Oral Short Session OS-4 (13)
3:30				
4:00		Poster Session	Reception	
4:30				
5:00	Registration Takeda Hall 5F			
5:30				
6:00	Welcome Reception Takeda Hall 5F			
6:30				
7:00				
7:30			Banquet Hotel Chinzanso Tokyo	
8:00				
8:30				
9:00				

Congress Program

27 September Sun.

HASEKO-KUMA Hall (Engineering Bldg11)

9:30~10:30

Doctoral school

Basics of carbonation of concrete

Ippei MARUYAMA
the University of Tokyo

10:45~12:00

Doctoral school

Hydration and Carbonation of Modern Cements – A Thermodynamic Perspective

Thomas MATSCHEI
TU Braunschweig

13:30~14:45

Doctoral school

Atomistic Modeling of Cementitious Materials: From Classical to Machine-Learning Interatomic Potentials

Takahiro OHKUBO
Chiba University

15:00~16:00

Doctoral school

Application of ^1H NMR relaxometry on cement-based materials: From Basic to Current Perspectives

Ryo KURIHARA
the University of Tokyo

16:15~17:30

Doctoral school

Carbonation Hardening of Cementitious Materials: Mechanisms, Performance and Industrial Boundaries

Maciej ZAJAC
Heidelberg Materials AG

28 September Mon.

Takeda Frontier Science Hall (The 5th floor of the Takeda Building)

9:00~9:30

Welcome address

9:30~11:00

Plenary Lecture-1 Plenary Lecture

Chairperson : Yogarajah ELAKNESWARAN (Hokkaido University)

PL1-01 Carbon Conscious Concrete and Global Warming Potential

9:30~10:00

Surendra P SHAH✳

Northwestern University, USA

PL1-02 Ambient carbonation

10:00~10:30

Gaurav SANT✳

University of California, Los Angeles, USA

PL1-03 Mineral carbonation hardening – niche or mainstream?

10:30~11:00

Ruben SNELLINGS✳

KU Leuven, Belgium

11:30~12:30

Oral Full Session-1 Carbonatable binders

Chairperson : Gaurav SANT (University of California, Los Angeles (UCLA))

OF1-01 Effect of Specimen Size of Cementitious Materials on CO₂ Uptake Amount

11:30~11:45

Luge CHENG✳¹⁾, Ryo KURIHARA¹⁾, Ryusei IGAMI¹⁾, Ippei MARUYAMA^{1,2,3)}

¹⁾The University of Tokyo, Japan, ²⁾Nagoya University, Japan, ³⁾Tohoku University, Japan

OF1-02 Effect of C₂S Phase Composition on Carbonation Performance of CO₂-Fixing Admixtures

11:45~12:00

Masataka USHIRO✳, Kazuya YAMASHITA, Taiichiro MORI

Denka Company Limited, Japan

OF1-03 Volume Change of β -C₂S Particles during Carbonation

12:00~12:15

Taiki WATANABE✳, Yoshifumi OHGI, Yoshifumi HOSOKAWA

TAIHEIYO CEMENT CORPORATION, Japan

OF1-04 Direct and indirect wet carbonation of industrial residues and their use as supplementary cementitious materials

12:15~12:30

Antonio GASÓ¹⁾, Marco MAZZOTTI¹⁾, Frank WINNEFELD✳²⁾

¹⁾ETH Zurich, Switzerland, ²⁾Empa, Switzerland

28 September Mon.

14:00~16:00

Oral Full Session-2**Carbonation hardening of concrete products/Utilization of CO₂-treated materials as concrete components**

Chairperson : Ruben SNELLINGS (KU Leuven)

OF2-01 The Development and Actual Application of Carbonated Glass Fiber Reinforced Stay-in-place Formwork

14:00~14:15

Kengo SEKI※, Kumar AVADH, Miyu TSUKADA, Takeshi TORICHIGAI
Kajima Corporation, Japan**OF2-02 Study the Effect of Carbonation Curing on Bending Strength and CO₂ Footprint of Low-OPC Clinker Reinforced Stay-in-place Formwork**

14:15~14:30

Kumar AVADH※, Kengo SEKI, Miyu TSUKADA
Kajima Corporation, Japan**OF2-03 Mechanical properties and carbonation behavior of concrete using CO₂-absorbing/cured cementitious material**

14:30~14:45

Yoji OMORAI※, Masao ISHIDA, Shimpei MAEHORI, Ryo KANEKO
TAIHEIYO CEMENT CORPORATION, Japan**OF2-04 Effect of Different Sulfate Sources on the Early Rheology and Hydration Kinetics of Carbonated Cement Pastes in OPC Systems**

14:45~15:00

Lukas DEFFNER※¹⁾, Carolin LAUERBURG¹⁾, Reto REITER¹⁾, Marie SINGER²⁾, Daniel JANSEN²⁾, Torben GÄDT¹⁾¹⁾Technical University of Munich, Germany,²⁾Friedrich-Alexander-University Erlangen-Nürnberg, Germany**OF2-05 Synergistic effects of carbonated recycled concrete aggregates, delithiated β -spodumene and GGBFS**

15:00~15:15

Diego ACEITUNO※, Xihong ZHANG
CIMP, School of Civil and Mechanical Engineering, Curtin University, Australia**OF2-06 High-Purity CaCO₃ Recovery from Concrete Waste via Temperature- and Pressure-Controlled CO₂ Mineralization**

15:15~15:30

Nami HASEGAWA※¹⁾, Yuya SAKAI²⁾¹⁾Department of Civil Engineering, Graduate School of Engineering, The University of Tokyo, Japan, ²⁾Institute of Industrial Science, The University of Tokyo, Japan**OF2-07 Effect of carbonated magnesium on magnesium-based binders**

15:30~15:45

Labeed AHMAD※¹⁾, Hoang NGUYEN¹⁾, Ellina BERNARD²⁾, Paivo KINNUNEN¹⁾¹⁾University of Oulu, Finland,²⁾Swiss Federal Laboratories for Materials Science and Technology (EMPA), Switzerland

28 September Mon.

OF2-08 Synthesis of Precipitated Calcium Carbonate *via* CO₂ Mineralization using By-Product Calcium Sources and Flue Gas

15:45~16:00

Kanako MATSUSE^{※1)}, Yuki KEZUKA^{1,2)}, Maya YOSHIDA¹⁾, Kazutaka KITA¹⁾, Kenichiro EGUCHI^{1,2)}, Yoshisada KAYANO^{1,2)}, Kazuki KIMURA²⁾, Atsushi MINAKAWA²⁾, Kazunari OKADA³⁾, Sho OYAMA³⁾, Takashi KOYAMA³⁾, Mitsuru KATO³⁾, Takuo NAKASHIMA³⁾

¹⁾Shiraishi Central Laboratories Co., Ltd., Japan, ²⁾Shiraishi Kogyo Kaisha, Ltd., Japan,

³⁾Konoike Construction Co., Ltd., Japan

16:30~17:54

Oral Short Session-1 CO₂ activation of waste powders/CO₂ treatment of solid wastes/Direct air carbonation

Chairpersons : Go IGARASHI (Nagoya University)

Atsushi TERAMOTO (Kyoto University)

OS1-01 Enhanced hydration of steel slag through internal carbonation induced by sodium bicarbonate

16:30~16:37

Ahyeon LIM[※], Juhyuk MOON

Seoul National Univ., Korea

OS1-02 Surface activation of granite waste powder with carbon dioxide for sustainable concrete

16:37~16:44

Adrian CHAJEC[※]

Wroclaw University of Science and Technology, Poland

OS1-03 Carbonation of Recycled Cement Paste to Produce Supplementary Cementitious Materials

16:44~16:51

Kingshuk MUKHERJEE^{※1)}, Subhashree PANDA²⁾, Prannoy SURANENI¹⁾

¹⁾University of Miami, USA, ²⁾New Jersey Institute of Technology, USA

OS1-04 Sonochemistry-driven Accelerated Carbonation of Solid Wastes: Structural Alteration and Mass Transfer Boost

16:51~16:58

Zhenjiang GU[※], Yingliang ZHAO, Xiao ZHANG, Long JIANG, Jionghuang HE, Yi JIANG, Peiliang SHEN, Chi Sun POON

the Hong Kong Polytechnic University, Hong Kong

OS1-05 CO₂ treatment for construction and demolition waste

16:58~17:05

Vladislava KOKHNO[※], Semion ZHUTOVSKY

Technion - Israel Institute of Technology, Haifa, Israel, Israel

OS1-06 Amino acid salts for enhanced CO₂ capture and mineral carbonation of BOF slag

17:05~17:12

Luka CEYSSENS[※], MiladinovićNina, Giuseppe GRANATA, Tom VAN GERVEN

KU Leuven, Belgium

28 September Mon.

OS1-07 Influence of water addition on process control and CO₂ uptake during the hydrothermal carbonation of RCA

17:12~17:19

Lisa FRANKENHAUSER✉, Angela ULLRICH, Krassimir GARBEV,
Peter STEMMERMANN, Dieter STAPF

Institute for Technical Chemistry (ITC), Karlsruhe Institute of Technology (KIT), Germany

OS1-08 Unlocking the carbonation reactivity in Ca-Fe phase of steel slag through high-gravity carbonation

17:19~17:26

Qifeng SONG✉, Tung-Chai LING

Jinan University, China

OS1-09 Effect of Al/Si Ratio on the Reactivity of Waste- and Two-step Carbonation-Derived Alumina-Silica Gel

17:26~17:33

Shunmin XIAO✉, Yi JIANG, Zihan MA, Long JIANG, Jionghuang HE, Qi LIU,
Peiliang SHEN, Chi Sun POON

The Hong Kong Polytechnic University, Hong Kong

OS1-10 Assessing amine-based accelerated carbonation of mechanically activated recycled concrete aggregate: A techno-economic study.

17:33~17:40

Oliver J. BEECROFT✉¹⁾, Liang LI²⁾, Chye Yi LEOW³⁾, Alfonso CHINNICI¹⁾,
Woei SAW³⁾, Hai YU²⁾¹⁾School of Electrical and Mechanical Engineering, Adelaide University, Australia,²⁾CSIRO Energy, Australia, ³⁾School of Chemical Engineering, Adelaide University, Australia**OS1-11** Properties of concrete using carbonated sludge water as mixing water

17:40~17:47

Emika KUROIWA✉, Kazuya HONDA, Masayoshi KONISHI, Shiro NAKAMURA,
Ayaji YASUMOTO

SUMITOMO OSAKA CEMENT CO., LTD., Cement/Concrete Research Laboratory, Japan

OS1-12 Effect of Relative Humidity on Carbonation of Aqueous Amine-mixed Hydrated Cement Paste

17:47~17:54

Harshani IRESHA✉¹⁾, Yogarajah ELAKNESWARAN¹⁾, Ryoma KITAGAKI¹⁾,
Ryosuke SAITO²⁾, Keiichi YANO²⁾, Yuya YODA²⁾, Koki MAEKAWA²⁾,
Masato TSUJINO²⁾, Akira NISHIDA²⁾, Hisanori SENBOKU¹⁾, Koji FUSHIMI¹⁾,
Masatoshi SAKAIRI¹⁾¹⁾Graduate School of Engineering, Hokkaido University, Japan,²⁾Shimizu Corporation, Shimizu Institute of Technology, Tokyo, Japan

18:00~19:00

Poster Session

P-01 Analysis of Rebar Corrosion in CO₂-Mineralized Cementitious Composite

Sanghyeon CHO✉, Jaeyun KIM, Jinwoo SONG, Wonseok CHUNG

Kyung Hee University, Korea

28 September Mon.

- P-02** **Carbonation and Strength Characteristics of CO₂-Cured Concrete Using Biochar-Coated Recycled Coarse Aggregates**
MINJE KIM✉, Kim DOHYUN, Han MINJAE, Suh HEONGWON
Pusan National University, Korea
- P-03** **Effect of particle size distribution of basic oxygen furnace slag on CO₂ uptake and pozzolanic reactivity**
Dong-Wook LEE✉, Ji-Hyun KIM, Chul-Woo CHUNG
Pukyong National University Div. of Architectural and Fire Protection Engineering, Korea
- P-04** **CO₂ Fixation in Concrete Fines Generated during the Production of Recycled Concrete Aggregate**
Masaaki MATSUSHIMA✉, Kiriya HIROKAZU, Shunsuke TANAKA, Tomohiko TAKAHASHI, Makio YAMASHITA
Mitsubishi UBE Cement Corporation, Japan
- P-05** **Development of Limestone Calcined Clay Cement (LC³) binder through Mineral Carbonizing Chlorine Bypass Dust (CBPD)**
Sumin JEONG✉, Heamin SONG, Hun SONG
KOREA INSTITUTE OF CERAMIC ENGINEERING AND TECHNOLOGY (KICET), Korea
- P-06** **Molecular Dynamics Simulation of pH-Dependent Carbonation of Tricalcium Aluminate Using the Interface Force Field**
AMAL MATHYAS PUTHENPURAYIL SHOBY✉, Anh PHAN, David FAUX
University of Surrey, UK
- P-07** **Atomistic Insights into the Role of Water in CaCO₃ Crystallization via Metadynamics Molecular Dynamics Simulations**
Takumi SAITO✉, Takahiro OHKUBO
Chiba Univ., Japan
- P-08** **Carbonation in Graphene–Carbon Black Modified Cement Pastes**
Nghia P. TRAN✉¹, Kien N. BUI², Ippei MARUYAMA², Huu-Tai THAI¹, Tuan NGO¹
¹The University of Melbourne, Australia, ²The University of Tokyo, Japan
- P-09** **Unraveling MDEA and HEPZ Enhanced CO₂ Activation on C-S-H Surfaces: A First-Principles Study**
Long LUO✉¹, Ryoma KITAGAKI¹, Dayoung OH¹, Yogarajah ELAKNESWARAN¹, Ryosuke SAITO², Keiichi YANO², Yuya YODA², Koki MAEKAWA², Masato TSUJINO², Akira NISHIDA², Hisanori SENBOKU¹, Koji FUSHIMI¹, Masatoshi SAKAIRI¹
¹Hokkaido Univ., Japan, ²Shimizu Corp., Japan
- P-10** **Experimental study on CO₂ capture during concrete mixing**
Osamu HASHIMOTO✉¹, Junichi MATSUMOTO¹, Atsushi YAMAMOTO², Ikuo NAKAYA³, Hidetoshi HAMADA³
¹Taisei Corporation, Japan, ²Kitagawa Corporation, Japan, ³GEOSTR Corporation, Japan

- P-11** **Effect of printing-induced fiber alignment on CO₂ sequestration of reactive MgO cement**
Yanchen HE✉, Jishen QIU
The Hong Kong University of Science and Technology (HKUST), Hong Kong
- P-12** **Carbonation Pathways of C-S-H at an Early Stage Revealed by Solid-State ¹³C/²⁹Si NMR**
Sayuri MOCHIZUKI✉, Takahiro OHKUBO
Chiba University Graduate School of Engineering, Japan
- P-13** **A Simplified Method for Estimating Chemical Admixture Dosage Based on the Bulk Density of Precipitated Calcium Carbonate**
Yosuke MITSUMORI✉¹⁾, Atsushi TAMURA¹⁾, Shinichi KOIZUMI¹⁾, Mio SAKAI²⁾, Takeshi TORICHIGAI²⁾, Tetsushi KANDA²⁾
¹⁾Sika Japan Ltd., Japan, ²⁾KAJIMA CORPORATION, Japan
- P-14** **Sustainable Cement Composites with Improved CO₂ Sequestration Using Rice Husk Ash and In-Situ CO₂ Mixing**
Donggue LEE✉, Juhyuk MOON
Seoul National University, Korea
- P-15** **Lime cement mortars with CDW and quarry dust as fine aggregates: a screening study for carbonation oriented design**
Alison L. SILVA¹⁾, Daiane M. SILVA²⁾, Luiz Paulo D. CORREIA²⁾, Luiz Carlos F. MENEZES JUNIOR²⁾, Arnaldo M. CARNEIRO✉²⁾, Paulo M. MAIOR²⁾
¹⁾University of Pernambuco, Brazil, ²⁾Federal University of Pernambuco, Brazil
- P-16** **Analysis of Strength and Pore Morphology in Carbonated Ordinary Portland Cement Pastes using X-ray Nanoimaging**
Minjae HAN✉, Minje KIM, Dohyun KIM, Heongwon SUH
Pusan National University, Korea
- P-17** **Pressurized CO₂-Enhanced Carbonation of Fly Ash under Different L/S Ratios**
Qi XU✉¹⁾, Dayoung OH¹⁾, Ryoma KITAGAKI¹⁾, Yogarajah ELAKNESWARAN¹⁾, Ryosuke SAITO²⁾, Keiichi YANO²⁾, Yuya YODA²⁾, Koki MAEKAWA²⁾, Masato TSUJINO²⁾, Akira NISHIDA²⁾, Hisanori SENBOKU¹⁾, Koji FUSHIMI¹⁾, Masatoshi SAKAIRI¹⁾
¹⁾Graduate School of Engineering, Hokkaido University, Japan, ²⁾Institute of Technology, Shimizu Corporation, Japan
- P-18** **Effect of Carbonation on the Mechanical Properties of Calcium-Activated Slag System Evaluated by Non-Destructive Testing**
Jiyeon PARK✉, Juyeon SON, Junho SHIN, Siyoung YOO, Byoungsun PARK
Korea university, Korea

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- P-19** **Influence of Cement Type and Hydration Curing Period on CaCO_3 Polymorph Selectivity during Carbonation Curing**
Hayato TAKAHASHI※¹⁾, Mai KIJIMA¹⁾, Shintaro MIYAMOTO¹⁾, Taiichiro MORI²⁾, Hirofumi HARA²⁾, Makoto HISADA¹⁾
¹⁾Tohoku University, Japan, ²⁾Denka Co., Ltd., Japan
- P-20** **Carbonation hardening of recycled mortar cast with recycled concrete fine aggregates**
Henrique C. GOMES※, Mitch SIMS, Amy MONEYPENNY, Boksun KIM
University of Plymouth, UK
- P-21** **Impact of Pre-Curing Strategy on the Mechanical Performance of Steel Slag-Based Carbon-Cured Concrete**
Marie-Laure HEYNDRICKX※, Beibei SUN, Veerle BOEL, Stijn MATTHYS
Ghent University, Belgium
- P-22** **Amine-regulated hydration pathways and carbonation coupling in cement system**
Xiaobo NIU※¹⁾, Yogarajah ELAKNESWARAN¹⁾, Daquan SHI¹⁾, Ryoma KITAGAKI¹⁾, Ryosuke SAITO²⁾, Keiichi YANO²⁾, Yuya YODA²⁾, Koki MAEKAWA²⁾, Masato TSUJINO²⁾, Akira NISHIDA²⁾, Hisanori SENBOKU¹⁾, Koji FUSHIMI¹⁾, Masatoshi SAKAIRI¹⁾
¹⁾Hokkaido University, Japan, ²⁾Institute of Technology, Shimizu Corporation, Japan
- P-23** **Effect of Early-Age Carbonation Curing on Subsequent Hydration of OPC Paste under Varying Pre-Curing Durations**
Charitha VOOTUKURI※, Meenakshi SHARMA
Indian Institute of Technology Hyderabad, India
- P-24** **A Study on Characteristics of Concrete Using Carbonated Dried Sludge Powder**
Hiroki SUGIMOTO※¹⁾, Ken OHKAWA²⁾, Yuta HASHIMOTO²⁾, Natsuyuki MIYATA²⁾, Shiro TOMOE¹⁾, Haruki MOMOSE¹⁾, Tetsushi KANDA¹⁾, Yusuke BABA³⁾
¹⁾Kajima Technical Institute, Japan, ²⁾Sanwasekisan Corporation, Japan, ³⁾Tokai University, Japan
- P-25** **Basic Study of Analytical Method for Inorganic Carbonate Using Thermogravimetry**
Tetsunari MIZUNO※, Tomoyuki HAYAKAWA
Japan Cement Association, Japan
- P-26** **Mineralization of Industrial Residues for CO_2 Sequestration and Circular Construction Applications**
Leila N. SOUSA¹⁾, Alexander O. RIVERA^{1,2)}, Jan SUCHORZEWSKI※¹⁾, Natalia I. DEDOUSI¹⁾, Gry M. MORTENSEN¹⁾
¹⁾Research Institutes of Sweden, Sweden, ²⁾Swedish Centre for Resource Recovery, Sweden

28 September Mon.

- P-27** **Acetic acid in aqueous carbonation of BOF steel slag: influence on carbon capture and reactivity.**
Giuseppe FERRARA✉¹⁾, Pedro HUMBERT²⁾, Paola PALMERO¹⁾
¹⁾Politecnico di Torino, Italy, ²⁾Innovation Centre for Sustainable Construction, CRH, Netherlands
- P-28** **Development of a Fast and Cost-Effective Laboratory Method for Carbonating Recycled Infra-Lightweight Concrete Powder**
Johannes M. BERGER✉, Sebastian SCHERB, Mathias KOEBERL, Karl-Christian THIENEL
University of the Bundeswehr Munich, Germany
- P-29** **Evaluation on the reactivity of wet carbonated basic oxygen furnace slag caused by the addition of diethanol-isopropanolamine**
Yunkyoung LEE✉, Jihyun KIM, Chulwoo CHUNG
Pukyong National University, Korea
- P-30** **Effect of Carbonation Curing Regimes on Compressive Strength and Nanoscale Pore Structure of Ordinary Portland Cement Paste**
Dohyun KIM✉, Min J. KIM, Min J. HAN, Heong W. SUH
Pusan National University, Korea
- P-31** **Proposal of Quantification Models for CO₂ Fixation in Mineral Carbonated Cement Composites.**
Hyangsun LEE✉, Hun SONG
Korea Institute of Ceramic Engineering and Technology, Korea
- P-32** **Sustainability & Carbon Capture in 3D Concrete Printing**
Ming-Jen TAN✉, Suvash PAUL, Jihye JHUN, Sean G. LIM, Jhunhyun LEE, Daniel TAY
Nanyang Technological University, Singapore
- P-33** **Roles of Biochar in Improving Carbon Sequestration in Cement-based Materials**
ZHAOCHENG LI✉, WENGUI LI
The University of New South Wales, Australia
- P-34** **Thermophysical Properties of Carbon-Negative Concrete -Specific Heat Capacity and Thermal Conductivity-**
Haruka ABE✉¹⁾, Kazuya YAMASHITA²⁾
¹⁾National Institute of Advanced Industrial Science and Technology (AIST), Japan, ²⁾Denka Co., Ltd., Japan
- P-35** **Carbonation of Synthetic Calcium Silicate Hydrates**
Ramachandran CHELLAPPANDIAN✉¹⁾, Nikita RAO²⁾, Sheetal K. JAIN²⁾, Aslam KUNHI MOHAMED¹⁾
¹⁾Indian Institute of Technology Madras, India, ²⁾Indian Institute of Science Bangalore, India

28 September Mon.

- P-36** **Pore Structure Transformation of Cement Paste due to Accelerated Carbonation**
Muhammad Haseeb ZAHEER※^{1,2)}, Hoon MOON¹⁾, Indong JANG¹⁾, Se-Hee HONG¹⁾,
Gi-Joon PARK¹⁾, Jung-Jun PARK¹⁾, Namkon LEE^{1,2)}
¹⁾Korea Institute of Civil Engineering and Building Technology, Korea,
²⁾University of Science and Technology, Korea
- P-37** **Mechanical and Durability Performance of Concrete with Microwave-Carbonated Steel Slag Fine Aggregates**
Taehoon KOH※
Korea Railroad Research Institute, Korea
- P-38** **Organofunctional Silane Engineering of Steel Slag Slurry for Enhanced CO₂ Mineralization in High-Gravity Carbonation**
Zambaga OTGONBAYAR※, Tung C. LING
Jinan University, China

29 September Tue.

Takeda Frontier Science Hall (The 5th floor of the Takeda Building)

8:30~10:00

Oral Full Session-3 **CO₂ activation of waste powders/CO₂ treatment of solid wastes**

Chairperson : POON C. SUN (The Hong Kong Polytechnic University, Jinan University)

OF3-01 **Phase assemblage, structure and reactivity of wet-carbonated blended cements with CAS glass as model SCMs**

8:30~8:45

Fabian NIEWÖHNER✉, Luis SCHNÜRER, Harald HILBIG, Alisa MACHNER

Technical University of Munich, Germany

OF3-02 **Rheology of Carbonated Demolition and Industrial Wastes: Time-dependence and Superplasticizer Compatibility**

8:45~9:00

Sruthi SREERAM✉^{1,2)}, Isabel P. SEGURA²⁾, Wilson R. LEAL DA SILVA²⁾, Timothy WANGLER¹⁾¹⁾Institute of Building Materials, ETH Zurich, Switzerland,²⁾Green Innovation, Fuller Technologies, Denmark**OF3-03** **Mineral carbonation using waste concrete powder with NH₄NO₃**

9:00~9:15

Namgyu PARK✉¹⁾, Juhyuk MOON^{1,2)}¹⁾Seoul National University, Department of Civil, Urban and Environmental Engineering, Korea,²⁾Institute of Construction and Environmental Engineering, Seoul National University, Korea**OF3-04** **Comparison of Carbonation Pathways Toward Enhancing the Cementitious Potential of Non-Ferrous Metallurgy Slags**

9:15~9:30

Ekin Türkü VAN VLAENDEREN✉, MiladinovićNina, Luka CEYSENS, Michiel GIELS, Tom VAN GERVEN, Yiannis PONTIKES

KU Leuven, Belgium

OF3-05 **Effect of Carbonation on Activation of BOF Slag: Role of C₂S and Brownmillerite**

9:30~9:45

Sahar KESHAVERZ✉¹⁾, Sieger VAN DER LAAN²⁾, Katrin SCHOLLBACH¹⁾, Jos BROUWERS¹⁾¹⁾TU Eindhoven, Netherlands, ²⁾Tata Steel Nederland, Netherlands**OF3-06** **Carbonation-relevant phase development in recycled concrete-derived materials for circular clinker and CO₂ mineralisation**

9:45~10:00

DIEGO JESUS DE SOUZA✉

Technical University of Denmark, Denmark

29 September Tue.

10:30~11:40

Oral Short Session-2 **Durability and properties of carbonated or CO₂-treated cementitious materials/Utilization of CO₂-treated materials as concrete components**

Chairpersons : Ryoma KITAGAKI (Hokkaido University)
Kenzo WATANABE (Kajima Corporation)

OS2-01 **Effect of Carbonated Concrete Slurry Residuals on Strength Development of Blast-furnace Slag Cement Mortar**

10:30~10:37

Shuichi ANDO※¹⁾, Masami UZAWA²⁾, Hiroyuki AOYAMA³⁾, Takeshi SASAKI³⁾

¹⁾Department of Civil Engineering, Graduate School of Industrial Technology, Nihon University, Japan, ²⁾Department of Sustainable Engineering, College of Industrial Technology, Nihon University, Japan, ³⁾Nippon Concrete Industries, Japan

OS2-02 **Effect of Calcium Carbonate Morphology on the Sulfate Resistance of Mortar in Low-Temperature Environment**

10:37~10:44

Yuki YOKOKAWA※¹⁾, Eita HOSODA¹⁾, Kosuke YOKOZEKI¹⁾, Takeshi TORICHIGAI²⁾

¹⁾TOYO University, Japan, ²⁾KAJIMA Corporation, Japan

OS2-03 **Carbonation-Induced Phase Evolution and Environmental Performance of DRI-EAF Slags as SCM**

10:44~10:51

Morteza TAYEBI※¹⁾, Marina BORZOVA¹⁾, Katrin SCHOLLBACH¹⁾,
Sieger R. VAN DER LAAN^{1,2)}, Jos BROUWERS¹⁾

¹⁾Technical University of Eindhoven (TU/e), Netherlands, ²⁾Tata Steel Nederland, Netherlands

OS2-04 **Phase evolution of magnesium carbonate cement under hydrothermal aging**

10:51~10:58

Hoang NGUYEN※, Labeed AHMAD, Mina ESMAILZADE, Paivo KINNUNEN
University of Oulu, Finland

OS2-05 **MICROSTRUCTURAL DENSIFICATION AND CHLORIDE RESISTANCE OF GGBFS CONCRETE UNDER CO₂ MIXING AND CO₂ CURING**

10:58~11:05

Kartik SAINI※^{1,2)}, Aditya S. RAJPUT²⁾, Anjaneya DIXIT¹⁾

¹⁾Indian Institute of Technology Roorkee, India, ²⁾Indian Institute of Technology Ropar, India

OS2-06 **Moisture Transport in Carbonated Cementitious Materials – A Review**

11:05~11:12

Hendrik SCHULZ※, Zhidong ZHANG, Ueli ANGST
ETH Zurich, Switzerland

OS2-07 **CO₂ Seeding Admixtures for Enhanced Concrete Activation**

11:12~11:19

Shipeng ZHANG※, Guangqi XIONG, Shuangshuang LIU
The Hong Kong Polytechnic University, Hong Kong

29 September Tue.

OS2-08 Utilization of CCU-Derived Calcium Carbonate in Concrete: Material Properties and Field Applications

11:19~11:26

Shigeyoshi MIYAHARA※¹⁾, Mamiko UMETSU¹⁾, Shota KONDO¹⁾, Keisuke KAWAMURA¹⁾, Kenichi HORIGUCHI¹⁾, Akihito HATA¹⁾, Masayoshi KONISHI²⁾¹⁾Taisei Corporation, Japan, ²⁾Sumitomo Osaka Cement Co., Ltd., Japan**OS2-09** Properties of concrete made with cement containing artificial limestone derived from waste gypsum as minor additional constituents

11:26~11:33

Kazuya HONDA※, Emika KUROIWA, Hisashi SAITO, Masayoshi KONISHI

Sumitomo Osaka Cement Co., Ltd, Japan

OS2-10 Assessment of the pozzolanic reactivity of silicates from mineral carbonation as a novel SCM

11:33~11:40

Dushadhi ATHAPATHTHU※¹⁾, Kirk VESSALAS¹⁾, Paul THOMAS¹⁾, Zhila A. ZADEH²⁾, Louise KEYTE²⁾, Niki JACKSON²⁾, Jason MANN²⁾, Jiayi FU¹⁾¹⁾School of Civil and Environmental Engineering, University of Technology Sydney (UTS), Australia,²⁾MCi Carbon, Australia

13:30~14:30

Plenary Lecture-2 Plenary Lecture

Chairperson : Wei WANG (Southeast University)

PL2-01 Net Zero Concrete

13:30~14:00

Chi Sun POON※

The Hong Kong Polytechnic University, Hong Kong

PL2-02 CaCO₃ Crystallization Pathways at Interfaces: Rethinking Cement Carbonation

14:00~14:30

Alejandro FERNANDEZ-MARTINEZ※

ISterre, CNRS & Univ. Grenoble Alpes, France

14:30~15:30

Oral Full Session-4 Carbonation enhancement of supplementary cementitious materials

Chairperson : Alejandro FERNANDEZ-MARTINEZ (ISterre (Grenoble, France))

OF4-01 Effect of Carbonation on the Mineralogy and Early Hydration Kinetics of Magnesium-Rich Mine Tailings as Supplementary Cementitious Materials

14:30~14:45

Mengfan YU※¹⁾, Wolfgang KUNTHER¹⁾, Martin RUDOLPH²⁾, Sahra HOMAEI^{3,4,2)}¹⁾DTU Sustain, Department of Environmental and Resource Engineering, Technical University of Denmark, Denmark, ²⁾Helmholtz-Zentrum Dresden-Rossendorf, Helmholtz-Institute Freiberg for Resource-Technology, Germany, ³⁾Institute of Process Engineering and Environmental Technology, TU Dresden, Germany, ⁴⁾Helmholtz-Zentrum Dresden-Rossendorf, Germany

29 September Tue.

OF4-02 Hydration and Strength of Slag-Blended Cement Paste with Amines under Carbonation
14:45~15:00

Jiali TU※¹⁾, Yogarajah ELAKNESWARAN¹⁾, Ryosuke SAITO²⁾, Ryoma KITAGAKI¹⁾, Keiichi YANO²⁾, Yuya YODA²⁾, Masato TSUJINO²⁾, Akira NISHIDA²⁾, Hisanori SENBOKU¹⁾, Koji FUSHIMI¹⁾, Masatoshi SAKAIRI¹⁾

¹⁾Graduate School of Engineering, Hokkaido University, Japan,

²⁾Institute of Technology, Shimizu Corporation, Japan

OF4-03 Use of BOF Steel Slags as carbonated SCMs - Part 1: Carbonation behavior
15:00~15:15

Christian FELTEN※, Katharina FRANKEN, Anya VOLLPRACHT

RWTH Aachen University - Institute for Building Materials Research, Germany

OF4-04 Use of BOF Steel Slags as carbonated SCMs - Part 2: Environmental behavior in free and cementitious systems
15:15~15:30

Katharina FRANKEN※, Christian FELTEN, Anya VOLLPRACHT

RWTH Aachen University - Institute for Building Materials Research, Germany

16:00~17:00

Oral Full Session-5 Carbonation enhancement of supplementary cementitious materials

Chairperson : Ryo KURIHARA (The University of Tokyo)

OF5-01 Role of Gel Formation and Carbonated Products Induced by Carbonation and Sodium Carbonate in FA-GGBS One-Part Geopolymers
16:00~16:15

Patharapong SUPPARANON※, Takeshi IYODA

Shibaura institute of technology, Japan

OF5-02 Scaling Novel SCMs via Carbonation of Magnesium and Calcium Silicates to Industrial Scale
16:15~16:30

Neshable NOEL, Lena MÜLLER※, Ahmed KHALIFA, Andreas M. BREMEN

Co-reactive GmbH, Germany

OF5-03 Microstructural Characterisation of Carbonation Hardened Foam Concretes
16:30~16:45

Mustafa Cem USTA※¹⁾, Antonino RUNCI²⁾, Hadi K. KAMYAB²⁾, Yury V. ZACCARDI²⁾, Hannes CLAES¹⁾, Ruben SNELLINGS¹⁾

¹⁾KU Leuven, Belgium, ²⁾Flemish Institute of Technological Research (VITO), Belgium

OF5-04 Steel corrosion implications of carbonation of concrete using low-clinker binders – A reactive-transport modeling study
16:45~17:00

Qin PANG, W. Jason WEISS, O. Burkan ISGOR※

Oregon State University, USA

30 September Wed.

Takeda Frontier Science Hall (The 5th floor of the Takeda Building)

8:30~10:00

Oral Full Session-6 Durability and properties of carbonated or CO₂-treated cementitious materials

Chairperson : Maciej ZAJĄC (Heidelberg Materials)

OF6-01 Low-Carbon Pervious Concrete as a Durable and Efficient CO₂ Storage Material

8:30~8:45

Zhidong ZHANG✉, Ueli ANGST
ETH Zurich, Switzerland**OF6-02** Utilization of carbonic anhydrase-treated recycled concrete aggregates in concrete: CO₂ uptake and mechanical performance

8:45~9:00

Xiulin CHEN✉, Zhidong ZHANG, Ueli ANGST
ETH Zurich, Switzerland**OF6-03** Effect of Lightweight Aggregate Size on Chloride Migration Resistance in Internal CO₂ Curing System

9:00~9:15

Jisu HAN✉¹⁾, Seongho HAN²⁾, Tae Hoon HAN¹⁾, Yubin JUN¹⁾, Jae Hong KIM¹⁾
¹⁾Korea Advanced Institute of Science and Technology, Korea,
²⁾Missouri University of Science and Technology, USA**OF6-04** Gypsum formation from ettringite in carbonated recycled concrete aggregates: relevance for sulfate behavior in fresh concrete

9:15~9:30

Alexander O. RIVERA^{1,2)}, Leila N. SOUSA✉¹⁾, Gilles PLUSQUELLEC¹⁾,
Jan SUCHORZEWSKI¹⁾, Katarina MALAGA^{1,2)}
¹⁾RISE - Research Institutes of Sweden, Sweden, ²⁾University of Borås, Sweden**OF6-05** Leaching Characteristics of Amine-Modified Cement Pastes

9:30~9:45

Zhijian LI✉¹⁾, Dayoung OH¹⁾, Ryoma KITAGAKI¹⁾, Yogarajah ELAKNESWARAN¹⁾,
Ryosuke SAITO²⁾, Keiichi YANO²⁾, Yuya YODA²⁾, Koki MAEKAWA²⁾,
Masato TSUJINO²⁾, Akira NISHIDA²⁾, Hisanori SENBOKU¹⁾, Koji FUSHIMI¹⁾,
Masatoshi SAKAIRI¹⁾
¹⁾Hokkaido University, Japan, ²⁾Shimizu Corporation, Japan**OF6-06** Carbonation Curing of Low-Carbon Engineered Cementitious Composites (ECC) with Portland Limestone Cement and GGBFS

9:45~10:00

Yi-Cheng LU, Yu-Huan TSENG, Chia-Ying CHUNG, Wei-Hsiu HU✉
Department of Civil Engineering, National Taiwan University, Taiwan

30 September Wed.

10:30~11:54

Oral Short Session-3 Mechanism of mineralization process/Carbonatable binders

Chairpersons : Takahiro OHKUBO (Chiba University)
Yuya SUDA (Niigata University)

OS3-01 Decomposition of the Layered Tobermorite into Silica Gel during Carbonation Revealed by Water Vapor Sorption Isotherms

10:30~10:37

Ryusei IGAMI※¹⁾, Go IGARASHI²⁾, Abudushalamu AILI²⁾, Ryo KURIHARA¹⁾,
Ippei MARUYAMA^{1,2,3)}

¹⁾The University of Tokyo, Japan, ²⁾Nagoya University, Japan, ³⁾Tohoku University, Japan

OS3-02 Carbonation of C-S-H Immersed in Potassium Carbonate Solution

10:37~10:44

Keisuke MITOME※¹⁾, Koya KAMIMURA²⁾, Ryoichi TAKAGI¹⁾, Yoshiyuki SUZUKI¹⁾,
Kento YONEDA³⁾, Tsuyoshi SAITO³⁾

¹⁾HAZAMA ANDO CORPORATION, Technical Research Institute, Japan,

²⁾HAZAMA ANDO CORPORATION, Tohoku Branch, Japan,

³⁾Department of Architecture, The University of Tokyo, Japan

OS3-03 Thermodynamic Stability and Formation Mechanisms of Siderite in CO₂ Mineralization Pathways

10:44~10:51

MOHAMMAD REZAEI※¹⁾, Marjan JOULAEI¹⁾, Alireza SALMACHI²⁾

¹⁾PhD Candidate, Australia, ²⁾Assistant Professor, Australia

OS3-04 A Mechanistic Understanding of Olivine Dissolution for Carbon Sequestration

10:51~10:58

Binglu WANG※, Shishir MUNDRA, Ueli ANGST

ETH Zurich, Switzerland

OS3-05 Unlocking the ITZ: How Enforced Carbonation Could Redefine Concrete Demolition Waste Separation

10:58~11:05

Tobias BADER※, Joerg RICKERT

VDZ Technology gGmbH, Cement Chemistry Department, Germany

OS3-06 Atomistic Mechanism of Silicate Leaching from Calcium Silicate Hydrate (C-S-H)

11:05~11:12

JESWIN JIJI※¹⁾, Sergey CHURAKOV²⁾, Ruotao YANG²⁾, Christophe LABBEZ¹⁾

¹⁾Université de Bourgogne Europe, France, ²⁾University of Bern, Switzerland

OS3-07 Carbonation of Blended Cements: Microstructural comparsion between natural and accelerated carbonation

11:12~11:19

Sudharsan RATHNA KUMAR※, Karen SCRIVENER

École Polytechnique Fédérale de Lausanne, Switzerland

30 September Wed.

- OS3-08** 11:19~11:26 **Time-resolved slurry carbonation of PC- and LC3-based binders with calcite and vaterite: mineralization kinetics, phase evolution, and retained reactivity**
Aron Berhanu DEGEFA✉, Ji-Hyun KIM, Chul-woo CHUNG
Pukyong National University, Korea
- OS3-09** 11:26~11:33 **Reactive Vaterite Cement: Phase Transformation and Hardening Mechanism**
Jiankai XIE¹⁾, Yi JIANG✉^{1,2)}, Peiliang SHEN¹⁾, Chi Sun POON¹⁾
¹⁾The Hong Kong Polytechnic University, China, ²⁾Jinan University, China
- OS3-10** 11:33~11:40 **Development of a High-Strength Cementless Steel Slag Binder via Glycine Activation and Carbonation Curing**
Seohyun KIM✉¹⁾, Juhyuk MOON^{1,2)}
¹⁾Department of Civil and Environmental Engineering, Seoul National University, Korea,
²⁾Institute of Construction and Environmental Engineering, Korea
- OS3-11** 11:40~11:47 **Can Siderite Stability Be Engineered for Its Use as a Binder in Mineral Carbonation Systems?**
Vineet SHAH✉¹⁾, Mima KURIAN¹⁾, Chris BUMBY¹⁾, Murray MCCURDY²⁾
¹⁾Victoria University of Wellington, New Zealand, ²⁾Earth Sciences New Zealand, New Zealand
- OS3-12** 11:47~11:54 **Additives for Selective Enhancement of MgCO₃ Solubility under Alkaline Conditions**
Fangyuan REN✉¹⁾, Hoang NGUYEN¹⁾, Fabien GEORGET²⁾, Juho YLINIEMI¹⁾, Claire GIRAUDAU³⁾, Paivo KINNUNEN¹⁾
¹⁾University of Oulu, Finland, ²⁾RWTH Aachen University, Germany,
³⁾CHRYSO Saint-Gobain Construction Chemicals, France

13:50~14:50

Plenary Lecture-3 Plenary Lecture

Chairperson : Ryo KURIHARA (The University of Tokyo)

- PL3-01** 13:50~14:20 **Atomic-scale insights into nucleation pathways of calcium carbonate in cementitious environments**
Hegoi MANZANO✉
University of the Basque Country, Spain
- PL3-02** 14:20~14:50 **Synergistic Hydration of Carbonated Recycled Concrete Paste and Conventional SCMs in Composite Cements**
Maciej ZAJAC✉
Heidelberg Materials AG, Germany

30 September Wed.

14:50~15:50

Oral Full Session-7 Mechanism of mineralization process

Chairperson : Hegoi MANZANO (Universidad del País Vasco UPV/EHU)

OF7-01 Atomic scale investigation of the CaCO₃ prenucleation clusters in cements

14:50~15:05

Aden RANA※, Hegoi MANZANO
University of the Basque Country, Spain

OF7-02 Carbonation-induced evolution of steel slag compacts revealed by in-situ synchrotron X-ray microtomography

15:05~15:20

Mingyu WANG※¹⁾, Elsa QOKU¹⁾, Fabien GEORGET²⁾, Eranga JAYAWICKRAMA¹⁾, Peter NIELSEN³⁾, Florian FUSSEIS¹⁾, Thomas MATSCHEI¹⁾
¹⁾RWTH Aachen University, Germany, ²⁾Université de Sherbrooke, Canada, ³⁾VITO, Belgium

OF7-03 Understanding the Carbonation Kinetics and Mechanisms of Pure-Phase Tricalcium Aluminate (C₃A)

15:20~15:35

Omnya ABDALLA※¹⁾, Elsa QOKU¹⁾, Fabien GEORGET²⁾, Patrick JUILLAND³⁾, Thomas MATSCHEI¹⁾
¹⁾RWTH Aachen University, Germany, ²⁾Université de Sherbrooke, Canada, ³⁾Sika Switzerland AG, Switzerland

OF7-04 Structural stability of Calcium Carbonate polymorphs and Substitution Effects from First-Principles Modeling

15:35~15:50

Batoul ASSI※
Universite Grenoble Alpes, CNRS, Grenoble INP, SIMaP, France

16:20~17:51

Oral Short Session-4 Carbonation enhancement of supplementary cementitious materials/Life cycle assessment and CO₂ uptake quantification/Carbonation hardening of concrete products

Chairpersons : Yogarajah ELAKNESWARAN (Hokkaido University)

Haruka TAKAHASHI (Taiheiyo Cement Co., Ltd.)

OS4-01 Carbonation-Based Valorisation of Basic Oxygen Furnace Slag for Partial Sand and Cement Replacement: Methods and Physical Property Evaluation

16:20~16:27

Sota YAMADA※, Kanta TAKEBE, Yogarajah ELAKNESWARAN
Graduate School of Engineering, Hokkaido University, Japan

OS4-02 The Significance of Water Content in the Porosity Assessment of Hardened Cementitious Materials under Accelerated Carbonation

16:27~16:34

Karen M. MASUNAGA※, Takeshi IYODA
Shibaura Institute of Technology, Japan

30 September Wed.

- OS4-03**
16:34~16:41 **Study on Reactions of Cement and Ground Granulated Blast-Furnace Slag Mixed with Carbonated Cement-based Material**
Yusuke ISHII✉, Ryosuke SUGANUMA, Hiroto FUJIKI, Daisuke KUROKAWA
Taiheiyo cement corporation, Japan
- OS4-04**
16:41~16:48 **Concurrent milling and carbonation of various industrial by-products and wastes for use as supplementary cementitious materials**
Claudia B. GARCÍA✉^{1,2)}, Mahipal KASANIYA³⁾, Viktor KOLCIC⁴⁾,
Kosar HASSANNEZHAD²⁾, Marijana SERDAR⁴⁾, Ruben SNELLINGS²⁾
¹⁾Department of Construction Engineering and Management, School of Engineering, Pontificia Universidad Católica de Chile, Chile, ²⁾Department of Earth and Environmental Sciences, KU Leuven, Belgium, ³⁾Department of Civil Engineering, University of New Brunswick, Canada, ⁴⁾Faculty of Civil Engineering, University of Zagreb, Croatia
- OS4-05**
16:48~16:55 **Integrated Numerical and Experimental Study on CO₂ Mineralization of Hydrated Cement-Free Binder Made of Slag-Calcite**
Krishnya SIVENTHIRARAJAH✉, Li CHUANG, Elakneswaran YOGARAJAH
Hokkaido University, Japan
- OS4-06**
16:55~17:02 **Seawater-based dissolved inorganic carbon-mediated carbonation of recycled concrete fines for morphology tuning**
Slyvester Y. CHAI✉, Tung C. LING
Jinan University, China
- OS4-07**
17:02~17:09 **Development and Application of Carbon-Negative wave-breaking blocks**
Mio SAKAI✉¹⁾, Kumar AVADH¹⁾, Kengo SEKI¹⁾, Goro SAKAI¹⁾, Satoshi NOBORU²⁾
¹⁾Kajima Corporation, Japan, ²⁾Fudo Tetra Corporation, Japan
- OS4-08**
17:09~17:16 **Comprehensive Assessment of Multi-Recycled Aggregate Concrete under CO₂ Curing**
Xin SHAO✉^{1,2)}, Tung-Chai LING^{1,2)}
¹⁾Jinan University, China, ²⁾Hunan University, China
- OS4-09**
17:16~17:23 **Quantitative Analysis of CO₂ Uptake in Concrete Cylinders Based on Bulk Grinding and Depth-Resolved Sampling Techniques**
Kazuya YAMASHITA✉, Taiichiro MORI
Omi Sustainability Promotion Dept., Denka Company Limited, Japan
- OS4-10**
17:23~17:30 **A framework for accounting for CO₂ management services provided by mineral carbonation products**
Fernanda BELIZARIO-SILVA✉, Guillaume HABERT
ETH Zurich, Switzerland

30 September Wed.

- OS4-11** **CO₂ uptake and mineral carbonation quantification in MgO-based binders**
17:30~17:37
Vincent HALLET✉, Ellina BERNARD, Claudia SCHREINER, Barbara LOTHENBACH, Frank WINNEFELD
EMPA, Swiss Federal Laboratories for Materials Science and Technology, Switzerland
- OS4-12** **Development of Carbon Capture and Storage Foamed Concrete Towards Higher Performance**
17:37~17:44
Dingqiang FAN✉, Chunpeng ZHANG, Jian-Xin LU, Chi S. POON
The Hong Kong Polytechnic University, Hong Kong
- OS4-13** **European Innovation Council X-SeeO₂ project: “Real-time X-ray diffraction and microstructure imaging of cement curing”**
17:44~17:51
Miguel A. ARANDA✉, Angeles G. DE LA TORRE, Pablo MENDEZ-ABREU, Ana CUESTA, Ning LI, Isabel SANTACRUZ
Universidad de Malaga, Spain



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