THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
土木及環境工程學系

RESEARCH CENTRE FOR RESOURCES ENGINEERING TOWARDS CARBON NEUTRALITY
碳中和資源工程研究中心

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固體廢棄物科學聯合實驗室

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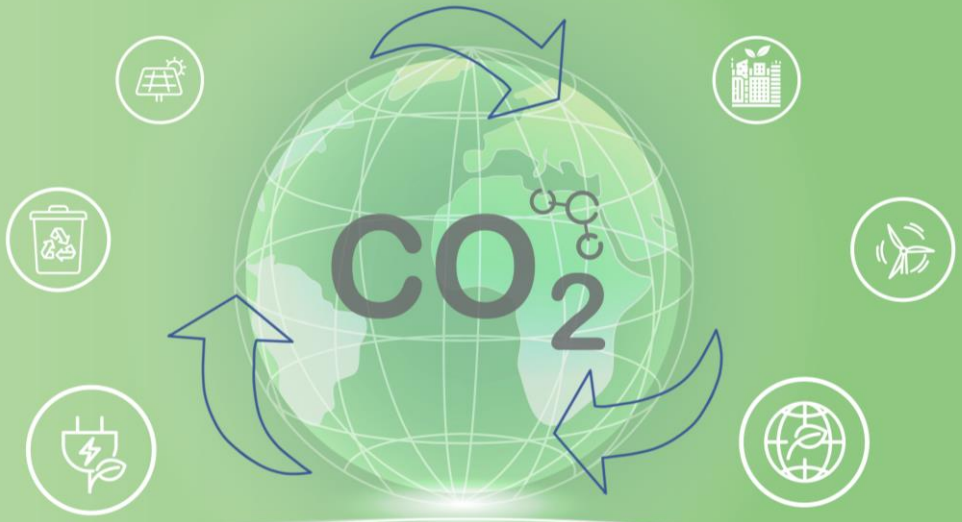
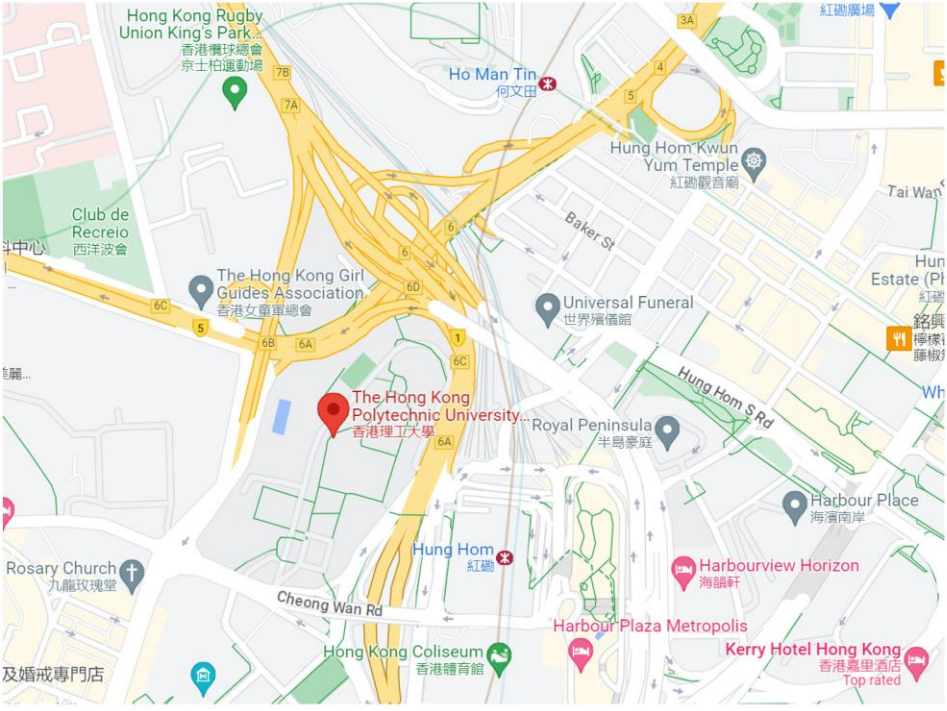
ReACT 2024

The 1st International Conference on Research and Application of Carbonation Technology for Wastes and Concrete

11-14 December 2024

Conference Programme Booklet

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Message from the Organising Committee Chairs

We are honoured and pleased to welcome you to the 1st International Conference on Research and Application of Carbonation Technology for Wastes and Concrete (ReACT2024). This conference is organised by the Research Centre for Resources Engineering Towards Carbon Neutrality and the Department of Civil and Environmental Engineering of The Hong Kong Polytechnic University, and the Solid Waste and Eco-materials Subcommittee of the Chinese Ceramic Society.

The conference aims to provide a platform for academics, researchers, industrial professionals, government officials and postgraduate students to exchange knowledge and ideas, and explore the challenges and opportunities associated with the research and application of advanced mineral carbonation technology for construction materials, especially for waste and concrete. The conference has drawn numerous abstract submissions from researchers from all over the world. After the review process, around 150 abstracts were accepted for presentation at the conference. We would like to make use of this opportunity to thank all authors who have contributed excellent papers to our conference, covering a spectrum of topics related to advanced technology in carbonation, CO_2 activation of fresh and hardening concrete, development of carbonatable binders, theory of carbonation, life cycle analyses and quantification of CO_2 uptake, etc.

We are honoured that Prof. Jos Brouwers from Eindhoven University of Technology, Prof. Thomas Matschei from RWTH Aachen University, Prof. Changwen Miao from Southeast University, Prof. Liwu Mo from Nanjing Tech University, Prof. Takafumi Noguchi from The University of Tokyo, Prof. Fazhou Wang from Wuhan University of Technology, and Dr Maciej Zajac from Heidelberg Materials AG have kindly accepted our invitation to be Keynote Speakers and share their knowledge, insights, and inspirations with us in the plenary sessions.

Our sincere gratitude also goes to our financial sponsor for the generous support. Last but not least, we would like to thank the Organising Committee members, especially the Conference Secretariat, for their assistance in putting together this conference.

On behalf of the Organising Committee, we hope you will find this conference stimulating, rewarding, and enjoyable. We also sincerely hope that you will continue to support our conferences and academic activities in the future. Thank you.

Prof. Chi-sun Poon Prof. Tung-chai Ling
Chairs
Conference Organising Committee
The 1st International Conference on Research and Application of Carbonation Technology for Wastes and Concrete

Conference Organising Committee

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Programme

Overview Schedule

Day 0: 11 December 2024 (Wednesday) The Hong Kong Polytechnic University (PolyU)	
17:00 – 19:00	Registration and Reception (Alumni Atrium, 1/F., Chung Sze Yuen Building (Core A), PolyU)

Day 1: 12 December 2024 (Thursday) The Hong Kong Polytechnic University (PolyU)				
08:30 – 09:00	Registration (Podium Floor, Block Z, PolyU)			
	Opening Session (Room Z209)			
09:00 – 09:15	Opening Address **Prof. Christopher Chao** Vice President (Research and Innovation) and Chair Professor of Thermal and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China Welcome Address **Prof. Chi-sun Poon** Chair of ReACT2024 Organising Committee and International Scientific Committee; Head of Department of Civil and Environmental Engineering, Director of Research Centre for Resources Engineering towards Carbon Neutrality, and Chair Professor of Sustainable Construction Materials, The Hong Kong Polytechnic University, Hong Kong, China			
09:15 – 09:20	Group Photo Taking (Room Z209)			
	Plenary Session I (Room Z209) Chairman: Prof. Chi-sun Poon			
09:20 – 09:50	**Green and Low-carbon Construction Materials** Prof. Changwen Miao Southeast University, China			
09:50– 10:20	**Circularity and Carbonation of Building Materials** Prof. Jos Brouwers Eindhoven University of Technology, The Netherlands			
10:20 – 10:50	Coffee Break (Podium Floor, Block Z, PolyU)			
10:50 – 12:30	Session A1 (Room Z205)	Session A2 (Room Z207)	Session A3 (Room Z209)	Session A4 (Room Z211)
12:30 – 14:00	Conference Lunch (Ju Yin House, 4/F., Communal Building, PolyU)			
14:00 – 15:30	Session B1 (Room Z205)	Session B2 (Room Z207)	Session B3 (Room Z209)	Session B4 (Room Z211)
15:30 – 16:00	Coffee Break (Podium Floor, Block Z, PolyU)			
	Plenary Session II (Room Z209) Chairman: Prof. Takafumi Noguchi			
16:00 – 16:30	**Innovative Pathways to Transform CO_2 into Carbon Mineralization Materials** Prof. Fazhou Wang Wuhan University of Technology, China			
16:30 – 17:00	**From Idea to Industrial Application: Enforced Carbonation of Recycled Concrete Paste** Dr Maciej Zajac Heidelberg Materials AG, Germany			
17:30 – 18:00	Travel from PolyU to North Point Passenger Ferry Pier by Coach			
18:00 – 21:00	Conference Banquet (Harbour Cruise – Bauhinia)			

Day 2: 13 December 2024 (Friday) The Hong Kong Polytechnic University (PolyU)				
08:30 – 09:00	Registration (Podium Floor, Block Z, PolyU)			
	Plenary Session III (Room Z209) Chairman: Prof. Thomas Matschei			
09:00 – 09:30	**Ideal Carbon-neutral Concrete with Permanent Circulation of Calcium and Carbon Dioxide** Prof. Takafumi Noguchi The University of Tokyo, Japan			
09:30 – 10:00	**Achieving Carbon Neutrality through Sustainable Construction Materials and Technologies** Prof. Chi-sun Poon The Hong Kong Polytechnic University, Hong Kong			
10:00– 10:30	Coffee Break (Podium Floor, Block Z, PolyU)			
10:30 – 12:30	Session C1 (Room Z205)	Session C2 (Room Z207)	Session C3 (Room Z209)	Session C4 (Room Z211)
12:30 – 14:00	Conference Lunch (Ju Yin House, 4/F., Communal Building, PolyU)			
14:00 – 15:30	Session D1 (Room Z205)	Session D2 (Room Z207)	Session D3 (Room Z209)	Session D4 (Room Z211)
15:30 – 16:00	Coffee Break (Podium Floor, Block Z, PolyU)			
	Plenary Session IV (Room Z209) Chairman: Prof. Jos Brouwers			
16:00 – 16:30	**Accelerated Carbonation of Ca/Mg-rich Solid Wastes: Reaction Mechanism, Products Design and Industrial Application** Prof. Liwu Mo Nanjing Tech University, China			
16:30 – 17:00	**CO_2 Beneficiation of German Lignite Fly Ash under Different Reaction Conditions and its Reactivity as SCM** Prof. Thomas Matschei RWTH Aachen University, Germany			
	Closing Session (Room Z209)			
17:00 – 17:15	Closing Remarks **Prof. Tung-chai Ling** Chair of ReACT2024 Organising Committee; Professor of College of Civil Engineering, Hunan University, China **Prof. Chi-sun Poon** Chair of ReACT2024 Organising Committee and International Scientific Committee; Head of Department of Civil and Environmental Engineering, Director of Research Centre for Resources Engineering towards Carbon Neutrality, and Chair Professor of Sustainable Construction Materials, The Hong Kong Polytechnic University, Hong Kong, China			

Day 3: 14 December 2024 (Saturday)	
09:15 – 12:30	Cultural Experience Tour (Dragon's Back, Shek O)

Session Schedule

Session	Topic	Date
Session A1	Advanced Technology in Carbonation	12 Dec, AM
Session A2	Theory of Carbonation	12 Dec, AM
Session A3	CO_2 Activation of Recycled Concrete Fines	12 Dec, AM
Session A4	Clinkering of Carbonatable Binder	12 Dec, AM
Session B1	CO_2 Activation of Recycled Concrete Aggregates	12 Dec, PM
Session B2	CO_2 Activation of Fresh and Hardening Concrete	12 Dec, PM
Session B3	CO_2 Activation of Ashes	12 Dec, PM
Session B4	Carbonation Modelling	12 Dec, PM
Session C1	CO_2 Activation of Metallurgical Slag	13 Dec, AM
Session C2	CO_2 Activation of Magnesium-Containing Materials	13 Dec, AM
Session C3	Carbonation Additives	13 Dec, AM
Session C4	Integration of Waste and CO_2 for Construction	13 Dec, AM
Session D1	Advanced Low-Carbon Technologies	13 Dec, PM
Session D2	Mineral Carbonation Materials as SCMs	13 Dec, PM
Session D3	Durability of CO_2 Enabled Concrete	13 Dec, PM
Session D4	Life Cycle Analyses and Quantification of CO_2 Uptake	13 Dec, PM

Day 1: 12 December 2024 (Thursday)					
Session A1	**Advanced Technology in Carbonation**				**Room Z205**
Chairmen	**Miren Etxeberria (Universitat Politécnica de Catalunya)** **Pan Feng (Southeast University)**				10:50 – 12:30
Invited Speech: Next Generation "Green Construction Materials" Developed by Mineral Carbonation of Steel Slags **Mieke Quaghebeur, Vlaamse Instelling voor Technologisch Onderzoek (VITO)**					10:50 – 11:10
1	Accelerated Carbonation through High Temperature of Cement-based Materials towards Low Carbon Construction	Dianchao Wang	The University of Tokyo	Oral	11:10– 11:25
2	Effects of Polymorphs of Calcium Carbonate on Compressive Strength of Calcium Carbonate Concrete	Masahito Tada	Taiheiyo Cement Corporation	Oral	11:25 – 11:40
3	Ex-situ Monitoring of Carbonation of Cement Paste Using Raman Microspectroscopy	Jiseul Park	Seoul National University	Oral	11:40 – 11:55
4	A Mild Strategy to In-situ Synthesize Strong Bulk CO_2 Mineralized Material Controlled by Organic Template	Jingze Chen	Wuhan University of Technology	Flash	11:55 – 12:00
5	Prolonged In-situ CO_2 Mixing for Enhancing Direct CO_2 Absorption and Compressive Strength of Cementitious Composite	Won Kyung Kim	Seoul National University	Flash	12:00 – 12:05
6	Study on the Mechanism of $NaHCO_3$-Promoted $CaSiO_3$ Carbonation Kinetics and Mechanical Property Enhancement	Chengbo Wei	Southeast University	Flash	12:05 – 12:10
7	Carbonation Mechanism of BOFS under High-Gravity Conditions and Optimization of the Carbon Removal Process	Qifeng Song	Hunan University	Flash	12:10 – 12:15
8	A Novel Approach for Improving Aqueous Carbonation Kinetics with CO_2 Micro- and Nano- Bubbles	Yi Jiang	The Hong Kong Polytechnic University	Flash	12:15 – 12:20
9	Role of Partial Limestone Calcination in Carbonated Lime-based Binders	Xiong Qian	The Hong Kong Polytechnic University	Flash	12:20 – 12:25

Day 1: 12 December 2024 (Thursday)					
Session A2	**Theory of Carbonation**				**Room Z207**
Chairmen	**Jun Chang (Hainan University)** **Carlos Thomas (University of Cantabria)**				10:50 – 12:30
Invited Speech: Critical Phenomena on the Acceleration of Carbonation of Cementitious Materials **Ippei Maruyama, The University of Tokyo**					10:50 – 11:10
1	Phase Evolution and Microstructure Changes Induced by Accelerated Carbonation in Natural Hydraulic Lime Paste with GGBFS Addition	Dongmin Wang	China University of Mining and Technology (Beijing)	Oral	11:10 –11:25
2	Carbonation Degree of C-S-H in Wet-dry Cycle	Dayoung Oh	Hokkaido University	Oral	11:25 – 11:40
3	Study on the Heat Conditions for Appropriate CO_2 Quantification Method in Cementitious Materials	Hayato Takahashi	Tohoku University	Oral	11:40 – 11:55
4	Impact of Ca/Si and Al/Si Ratios on the Alumina-Silica Gel Formed by Wet Carbonation of Synthesized C-S-H Phases and Ettringite	Jiayi Song	Aarhus University	Oral	11:55 – 12:10
5	Study on the Hardening Mechanism of Natural Hydraulic Lime (NHL) under Hydration and Carbonation	Guodong Qi	China University of Mining and Technology (Beijing)	Flash	12:10 – 12:15
6	Insights into the Simultaneous Formation and Carbonation of C-S-H: The Effect of Initial pH	Yuxi Cai	Southeast University	Flash	12:15 – 12:20
7	Comparison of the C_3S, C_2S, and Cement Dissolutions in Water and CO_2 Solutions	Wei Tang	Shenzhen University	Flash	12:20 – 12:25
8	Cold Sintering of $CaCO_3$ Polymorphs: Exploring the Strength Origin in Calcium Carbonate Matrix	Jinzewei Nie	Southeast University	Flash	12:25 – 12:30

Day 1: 12 December 2024 (Thursday)					
Session A3	**CO_2 Activation of Recycled Concrete Fines**				**Room Z209**
Chairmen	**Xiaojian Gao (Harbin Institute of Technology) Juhyuk Moon (Seoul National University)**				10:50 – 12:30
Invited Speech: Reactivity of Aqueous Carbonated Blended Portland Cement Pastes Jørgen Skibsted, Aarhus University					10:50 – 11:10
1	Re-CEM: Applicability of Recycled Concrete Paste as SCM through CCU – Elucidating the Correlation between Chemical Composition, Amorphous Gel Structure, and Pozzolanic Reactivity	Fabian Niewöhner	Technical University of Munich	Oral	11:10 – 11:25
2	Exploring the Use of Concrete Waste Fines in Lightweight Porous Cement-based Blocks through Carbonation	Leila Nobrega Sousa	Eindhoven University of Technology	Oral	11:25 – 11:40
3	Carbonation of RCF with Additional Additive: The Effect on Crystallinity of Carbonates	Yilu Chen	Eindhoven University of Technology	Oral	11:40 – 11:55
4	Unlocking the Carbonation Process of Recycled Concrete: Insights from Industrial Recycled Concrete Fines	Yan Luo	Eindhoven University of Technology	Oral	11:55 – 12:10
5	Mineral Carbonation of Recycled Concrete Paste	Namgyu Park	Seoul National University	Flash	12:10– 12:15
6	Rapid Carbonation Process of Recycled Concrete Powders in a High-Gravity Rotating Packed Bed	Zhenjiang Gu	The Hong Kong Polytechnic University	Flash	12:15 – 12:20
7	Connection between Carbonation Regimes and Early Pozzolanic Reactivity of Recycled Concrete Powder: Impact of Composition and Microstructure	Zihan Ma	The Hong Kong Polytechnic University	Flash	12:20 – 12:25
8	Vaterite $CaCO_3$ Binder from Indirect Carbonation of Waste Concrete Fines	Tiejun Ding	Imperial College London	Flash	12:25 – 12:30

Day 1: 12 December 2024 (Thursday)					
Session A4	**Clinkering of Carbonatable Binder**				**Room Z211**
Chairmen	**Luc Courard (University of Liege)** **Liwu Mo (Nanjing Tech University)**				10:50 – 12:30
Invited Speech: Elucidating the Role of Different Phases in Carbonatable Binders **Zhichao Liu, Wuhan University of Technology**					10:50 – 11:10
1	Transforming Ferronickel Slag in Magnesium Silicate Binder after a Carbonation/Decarbonation Process	Martin Cyr	Toulouse University	Oral	11:10 – 11:25
2	Durability of Calcium Phosphate Modified Portland Cement Exposed to Supercritical CO_2 Environment	Chul-Woo Chung	Pukyong National University	Oral	11:25 – 11:40
3	The Utilization of Red Mud for Uranium Mineralization by a Low-Temperature Sintering Process	Minhua Su	Guangzhou University	Oral	11:40 – 11:55
4	Novel Insight to Preparing High Carbonation Reactivity Wollastonite Fibers through Phase Transformation Treatment	Donglin Li	Henan Polytechnic University	Flash	11:55 – 12:00
5	Feasibility, Performance and Carbonation Mechanism of Ternesite as an Ultra-low Lime CO_2 Sequestration Binder	Xiaoyun Du	Dalian University of Technology	Flash	12:00 – 12:05
6	Design of C_2S-CS Low-calcium Phase System for Synergistic Improvement of CO_2 Sequestration Capacity and Mechanical Properties	Ning Tan	Southeast University	Flash	12:05 – 12:10
7	Revisiting the Carbonation Behavior of C_3S_2 to Elucidate the Role of Silica Gel in the Mechanical Strength of Carbonated Matrix	Zhipeng Zhang	Wuhan University of Technology	Flash	12:10 – 12:15
8	Production of MSWI-Based Belite-Ternesite Cement with Enhanced CO_2 Reactivity	Xiaoli Wang	Hunan University	Flash	12:15 – 12:20
9	Chlorellestadite: An Apt Binder or an SCM with Carbonation Reactivity	Hanxiong Lyu	The Hong Kong Polytechnic University	Flash	12:20 – 12:25
10	Development of Highly Carbonation-Effective Calcium Silicates (β-C_2S): Phase Evolution, Microstructure, and Carbonation Mechanisms	Miao Ren	The Hong Kong Polytechnic University	Flash	12:25 – 12:30

Day 1: 12 December 2024 (Thursday)					
Session B1	**CO_2 Activation of Recycled Concrete Aggregates**				**Room Z205**
Chairmen	**Mieke Quaghebeur (Vlaamse Instelling voor Technologisch Onderzoek) Baojian Zhan (Shenzhen University)**				14:00 – 15:30
1	Impact of Carbonated Recycled Aggregates on the Carbonation Resistance of Concrete	Miren Etxeberria	Universitat Politécnica de Catalunya. BarcelonaTECH	Oral	14:00 – 14:15
2	Wet-Carbonation of RCAs for Improved Carbonation Efficiency and Mechanical Properties of Carbonated RCAs and RCA Concrete	Zhanping You	Michigan Technological University	Oral	14:15 – 14:30
3	CO_2 Fixed by Recycled Aggregate in a Medium-Scale Carbonation Facility	Takahiro Iwafuchi	Hazama Ando Corporation	Oral	14:30 – 14:45
4	Study of CO_2 Fixation in Recycled Aggregate Using Potassium Carbonate Solution	Rei Yoshino	Hazama Ando Corporation	Oral	14:45 – 15:00
5	Mechanical Properties of Recycled Concrete with Carbonated Recycled Sand	Kyung Chan Hong	CECM Co. Ltd.	Oral	15:00 – 15:15
6	Characterization of the Interfacial Transition Zone between Carbonated Recycled Aggregates and New Cementitious Matrix: The Interactions between Different Cements and Carbonation Products	Karen Midori Masunaga	Shibaura Institute of Technology	Flash	15:15 – 15:20
7	Fully Recycled Aggregate Concrete (RAC) with Recycled Concrete Powder (RCP): Enhancement Using CO_2 Mineralization	Ligang Peng	The Hong Kong Polytechnic University	Flash	15:20 – 15:25
8	Activated Biochar Saturated with CO_2 as Internal Carbonation Curing Activator for Enhancing Mechanical Property of Cement Paste	Renming Wu	The Hong Kong Polytechnic University	Flash	15:25 – 15:30

Day 1: 12 December 2024 (Thursday)					
Session B2	**CO_2 Activation of Fresh and Hardening Concrete**				**Room Z207**
Chairmen	**Zhichao Liu (Wuhan University of Technology) Ippei Maruyama (The University of Tokyo)**				14:00 – 15:30
1	High-Temperature Performance of SCMs Blended Cementitious Materials Subject to CO_2 Curing	Ming-Zhi Guo	Shaoxing University	Oral	14:00 – 14:15
2	Development of Advanced Carbonation Technologies for Concrete and Solid Waste	Peiliang Shen	The Hong Kong Polytechnic University	Oral	14:15 – 14:30
3	The Reaction Mechanisms of Cement incorporating FA and GGBS during CO_2 Curing and Further Hydration	Pingping He	Changsha University of Science and Technology	Oral	14:30 – 14:45
4	Effect of Pre-Treatment Method on Accelerated Carbonation of Hardened Cement Paste	Luge Cheng	The University of Tokyo	Oral	14:45 – 15:00
5	Microwave-CO_2 Combined Curing Technology for Low-Carbon Development of Ultra-High-Performance Concrete (UHPC)	Yuan Feng	Wuhan University of Technology	Flash	15:00 – 15:05
6	Use of Carbonated Water for Carbon Sequestration in OPC and Low-Carbon Cement Systems	Aswathy Rajendran	University of Cambridge	Flash	15:05 – 15:10
7	Rapid Demolding of Precast Cement Mortar for CO_2 Curing: A Custom Mold Design	Jinxin Wei	Hunan University	Flash	15:10 – 15:15
8	Insights into the Synergetic Action of Hydration and Carbonation of Portland Cement	Jionghuang He	The Hong Kong Polytechnic University	Flash	15:15 – 15:20
9	Damage Characterization of Carbonated Cement Pastes with a Gradient Structure	Qinglong Qin	The Hong Kong Polytechnic University	Flash	15:20 – 15:25
10	Unveiling the CO_2 Intake in C-S-H Effected by Surface Property	Gen Li	The Hong Kong Polytechnic University	Flash	15:25 – 15:30

Day 1: 12 December 2024 (Thursday)					
Session B3	**CO_2 Activation of Ashes**				**Room Z209**
Chairmen	**Jørgen Skibsted (Aarhus University) Wei Wang (Southeast University)**				14:00 – 15:30
Invited Speech: Modification of Carbonation Mineralization on Supplementary Cementitious Materials Xiaojian Gao, Harbin Institute of Technology					14:00 – 14:20
1	Efficiency of Processes for the Carbonation of Municipal Solid Wastes Bottom Ash	Luc Courard	University of Liege	Oral	14:20 – 14:35
2	Mineral Carbonation and Stabilization of Converter Slag Using Supercritical CO_2	Chul-Woo Chung	Pukyong National University	Oral	14:35 – 14:50
3	Effect of Carbonated Sludge Powder on Compressive Strength of Mortar	Lett Wai Nwe	Tokyo Metropolitan University	Oral	14:50 – 15:05
4	Preparation of In-situ Grown Nano-Silica Based on Fly Ash by Carbonization Method: Improving Nano-Silica Dispersity and Sequestering CO_2	Hailong Sun	Southeast University	Flash	15:05 – 15:10
5	Utilization of Carbonated Steel Slag as Supplementary Cementitious Material: A Review of Mechanism, Methods and Applications	Xingtong Yue	University of Science and Technology Beijing	Flash	15:10 – 15:15
6	Mechanical Properties and Microscopic Characteristics of Ternary Composite Carbonated Cementitious Materials of S95 Grade Blast Furnace Slag-Steel Slag-Calcium Carbide Slag	Wene Ma	Southeast University	Flash	15:15 – 15:20
7	Impact and Mechanism of Ultrasonic Carbonated MSWI Fly Ash on CO_2 Mineralization Curing of Cement	Jie Chen	Zhejiang University	Flash	15:20 – 15:25
8	High-Temperature Carbonation Behavior, Reaction Kinetics and Microstructural Change of Hydraulic and Non-Hydraulic Calcium Silicates	Hao Yu	Hunan University	Flash	15:25 – 15:30

Day 1: 12 December 2024 (Thursday)					
Session B4	**Carbonation Modelling**				**Room Z211**
Chairmen	**Qiang Wang (Tsinghua University)** **Hongyu Zhou (University of Tennessee Knoxville)**				14:00 – 15:30
Invited Speech: Comprehensive Molecular-Scale Insights on the Interfacial CO_2 Mineralization of Portlandite **Roland Pellenq, CNRS and University of Montpellier**					14:00 – 14:20
1	Study of Carbonation Kinetics of a Recycled Sand	Rachid Cherif	University of La Rochelle	Oral	14:20 – 14:35
2	Nanoscale Mechanisms of CO_2 Docking in Mineral Mesopores at Different Relative Humidities	Yong Tao	The Hong Kong Polytechnic University	Oral	14:35 – 14:50
3	Hygro-Thermo-Chemical Modeling of Accelerated Carbonation Curing of Cementitious Materials at Early Age	Lifu Yang	City University of Hong Kong	Oral	14:50 – 15:05
4	Probing Al Uptake in C-S-H Gels via DFT and Molecular Dynamics Simulations: Towards Maximizing Al/Si Ratios and Chloride Ion Adsorption	Li Zhang	Henan Polytechnic University	Flash	15:05 – 15:10
5	Impact of Fe Doping on the Reactivity of γ-Dicalcium Silicate: Insights from DFT Calculations	Meicheng Zhao	Wuhan University of Technology	Flash	15:10 – 15:15
6	The Carbonation and Hardening Properties of Larnite, Åkermanite and Merwinite in Steel Slag: A Study from Experiments and DFT Calculations	Xinyu Zhang	Henan Polytechnic University	Flash	15:15 – 15:20
7	Numerical Study of Limestone Particles Calcination in a Drop Tube Furnace	Sumin Song	Korea Institute of Industrial Technology	Flash	15:20 – 15:25
8	Numerical Analysis of CaO Particles Carbonation	Heesung Choi	Korea Institute of Industrial Technology	Flash	15:25 – 15:30

Day 2: 13 December 2024 (Friday)					
Session C1	**CO_2 Activation of Metallurgical Slag**				**Room Z205**
Chairmen	**Rachid Cherif (University of La Rochelle)** **Bo Li (University of Nottingham Ningbo China)**				10:30 – 12:30
Invited Speech: Co-carbonation Behaviors of Metallurgical Slag-cement in Aqueous Conditions **Qiang Wang, Tsinghua University**					10:30 – 10:50
1	Hydration and Carbonation Reactions of Natural Hydraulic Lime under Different CO_2 Concentrations	Ze Liu	China University of Mining and Technology (Beijing)	Oral	10:50 – 11:05
2	Utilization of Local Raw Materials and Mine Waste to Manufacture Cement in the Northwest Territories, Canada	Guangping Huang	Chinese Academy of Sciences	Oral	11:05 – 11:20
3	In-situ Wet Carbonation of Steel Slag Powder Paste Made with Carbonated Water: Interaction Mechanism between Carbonation and Hydration	Wei Wang	Southeast University	Oral	11:20 – 11:35
4	Transform AOD Slag toward a High-Reactive Mineral Admixture with Appreciable CO_2 Sequestration	Peng Liu	Nanjing Tech University	Oral	11:35 – 11:50
5	Application of Carbonation-Based Treatments to Valorise Residues from EAF Steel Production	Alessandra Masi	University of Rome Tor Vergata	Oral	11:50 – 12:05
6	Decoding Carbonated Steel Slag: A Visualization Study of the Barrier Layer	Linshan Li	Harbin Institute of Technology	Flash	12:05 – 12:10
7	Preparation of Carbon-negative Artificial Lightweight Aggregates by Carbonating Sintered Red Mud (SRM): CO_2 Sequestration, Microstructure and Performance	Maochun Xu	Nanjing Tech University	Flash	12:10 – 12:15
8	Microstructural Study on the Carbonation of Glycine-Activated Steel Slag	Seohyun Kim	Seoul National University	Flash	12:15 – 12:20
9	In-situ Carbonation of BOFS Blended Cement Paste via 13X Zeolite	Zhikai Wang	Hunan University	Flash	12:20 – 12:25
10	The Balance between Hydration and Carbonation within Carbonation-enhanced Aerated Concrete: Comparative Study on Curing Regimes and Carbonation Binder	Rui Sun	The Hong Kong Polytechnic University	Flash	12:25 – 12:30

Day 2: 13 December 2024 (Friday)					
Session C2	**CO_2 Activation of Magnesium-Containing Materials**				**Room Z207**
Chairman	**Rui Yu (Wuhan University of Technology)**				10:30 – 12:30
Invited Speech: Understanding the Influence Mechanism of MgO Doping on the Sintering and Performance of Ternesite-based CO_2 Sequestration Binder **Jun Chang, Hainan University**					10:30 – 10:50
1	Mechanical and Microscopic Properties of Organic Soil Carbonated and Solidified by Reactive MgO Combined with ISSA	Guanghua Cai	Nanjing Forestry University	Oral	10:50 – 11:05
2	Tailoring High-Magnesium Cements for Enhanced Carbonation Hardening and CO_2 Sequestration	Songhui Liu	Henan Polytechnic University	Oral	11:05 – 11:20
3	Effect of Temperature and CO_2 Pressure on the Carbonation Efficiency and Products of Magnesium Slag	Zhibin Ma	Shanxi University	Oral	11:20 – 11:35
4	The Role of Internal Moisture Content (IMC) in the Carbonation Efficiency of Natural Fibers Reinforced Reactive Magnesia Cement (NFs-RMC)	Bo Wu	The Hong Kong University of Science and Technology	Oral	11:35 – 11:50
5	Preparation of Mg-modified CO_2 Sequestration Binder and its Carbonation Behaviors	Yajuan Peng	University of Jinan	Flash	11:50 – 11:55
6	Characterising Reaction Processes of Sodium Sulphate-activated Slag Paste with MgO	Zhanhui Lu	University of Nottingham Ningbo China	Flash	11:55 – 12:00
7	Investigating the Carbonation-Induced Volume Change in Reactive Magnesia Cement	Pauline Rose Quiatchon	The Hong Kong University of Science and Technology	Flash	12:00 – 12:05
8	Effects of CO_2 Carbonation on the Properties of CSA-Steel Slag Composite Cementitious Materials	Jialin Song	Shandong University	Flash	12:05 – 12:10
9	Enhanced Aqueous Carbonation of BOFS Fine Aggregates Efficiency Using Na_2CO_3	Haodong Lin	Hunan University	Flash	12:10 – 12:15
10	Bonding and Micro-Mechanical Properties of Steel Slag Carbonation	Jie Li	Hunan University	Flash	12:15 – 12:20

Day 2: 13 December 2024 (Friday)					
Session C2	**CO_2 Activation of Magnesium-Containing Materials**				**Room Z207**
Chairman	**Rui Yu (Wuhan University of Technology)**				10:30 – 12:30
11	Functional Biochar for Permanent Capture of CO_2 and Its Use in Mortar Block: A Step Towards CO_2 Emission to Capture	Razia Sultana	The Hong Kong Polytechnic University	Flash	12:20 – 12:25
12	Study the Pozzolanic Reactivity of Si-Al Gel with Different Si/Al Ratio	Shunmin Xiao	The Hong Kong Polytechnic University	Flash	12:25 – 12:30

Day 2: 13 December 2024 (Friday)					
Session C3	**Carbonation Additives**				**Room Z209**
Chairmen	**Sze-dai Pang (National University of Singapore)** **Liwei Zhang (Chinese Academy of Sciences)**				10:30 – 12:30
Invited Speech: Appropriate Technologies to Stimulate Hydration or Carbonation of Industrial By-products **Juhyuk Moon, Seoul National University**					10:30 – 10:50
1	Enhancing Effect of β-cyclodextrin on Carbonation Properties of Steel Slag	Yunhua Zhang	Hubei University of Technology	Oral	10:50 – 11:05
2	Biomolecular Regulated Carbonation to Process Calcium-Rich Alkaline Industrial Wastes into Supplementary Cementitious Materials	Hongyu Zhou	University of Tennessee Knoxville	Oral	11:05 – 11:20
3	Innovative Use of Amines to Enhance CO_2 Mineralisation in Steel Slag for Eco-Friendly Construction Materials	Yogarajah Elakneswaran	Hokkaido University	Oral	11:20 – 11:35
4	Internal-external Synergistic CO_2 Sequestration of Cement-Based Materials Using Amino Acid Salts	Tiefeng Chen	Harbin Institute of Technology	Oral	11:35 – 11:50
5	Improving Carbon Dioxide Sequestration in Concrete Waste through Polymer Modification	Ekaterina Kravchenko	Southern Federal University	Oral	11:50 – 12:05
6	The Role of Additive on Carbonation Behavior and Mechanical Properties of Low Calcium Silicate Materials	Junil Pae	Seoul National University	Flash	12:05 – 12:10
7	Enhanced Hydration of Ground Steel Slag with Chemical Activator	Ahyeon Lim	Seoul National University	Flash	12:10 – 12:15
8	Controllable $CaCO_3$ Synthesis from Solid Waste by an “All-in-one” Amino Acid-in Strategy	Xuan Zheng	Huazhong Agricultural University	Flash	12:15 – 12:20
9	Improvement in the Carbon Capture of Cementitious Materials Using Hydrogel	Tao Wang	Hunan University	Flash	12:20 – 12:25
10	Mechanism of Organic Additives-induced Carbonation Activators on Affecting Cement Mortars	Shuangshuang Liu	The Hong Kong Polytechnic University	Flash	12:25 – 12:30

Day 2: 13 December 2024 (Friday)					
Session C4	**Integration of Waste and CO_2 for Construction**				**Room Z211**
Chairmen	**Roland Pellenq (CNRS and University of Montpellier) Zhanping You (Michigan Technological University)**				10:30 – 12:30
1	Marine Structures with Recycled Concrete and Non-Metallic Reinforcements	Carlos Thomas	University of Cantabria	Oral	10:30 – 10:45
2	Mechanisms and Advancements in Microwave-Enhanced CO_2 Mineralization of Lightweight Porous Concrete	Shuqiong Luo	Henan Polytechnic University	Oral	10:45 – 11:00
3	CO_2-driven 3D Concrete Printing Technologies	Shipeng Zhang	The Hong Kong Polytechnic University	Oral	11:00 – 11:15
4	Valorization of Wasted-Derived Biochar in Ultra-High-Performance Concrete (UHPC): Pretreatment, Characterization, and Environmental Benefits	Jiang Du	Chongqing Jiaotong University	Oral	11:15 – 11:30
5	Different Approaches of CO_2 Sequestration in Cementitious Materials Manufacturing	Zhuo Liu	Wuhan Institute of Technology	Oral	11:30 – 11:45
6	Upcycling of Baghouse Fines into Artificial Aggregate for Permeable Paving Bricks	Yuguang Wang	University of Nottingham Ningbo China	Flash	11:45 – 11:50
7	Direct Ink Writing of Non-Sintered Ceramic with Biomimetic Cellular Structure	Kaiyun Huang	Wuhan University of Technology	Flash	11:50 – 11:55
8	Elucidating how CO_2 Influences Rheological Time-Varying Behavior of Cementitious System Based on Improved Particle Linkage (IPL) Theory	Hengrui Liu	The Hong Kong Polytechnic University	Flash	11:55 – 12:00
9	Evaluation of Viscoelastic Properties in Fresh Cement Paste with CO_2 Mixing	Kaiyin Zhao	The Hong Kong Polytechnic University	Flash	12:00 – 12:05
10	Innovative Development of Carbon-Sink High-Strength Foam Concrete for Carbon Neutral Applications	Dingqiang Fan	The Hong Kong Polytechnic University	Flash	12:05 – 12:10

Day 2: 13 December 2024 (Friday)					
Session D1	**Advanced Low-Carbon Technologies**				**Room Z205**
Chairmen	**Yogarajah Elakneswaran (Hokkaido University)** **Ze Liu (China University of Mining and Technology (Beijing))**				14:00 – 15:30
1	Application of "Wastes" in Green Ultra-High Performance Concrete: Mechanism and Prospect	Rui Yu	Wuhan University of Technology	Oral	14:00 – 14:15
2	Morphologic Control of Graphitic Carbon Nitride for Photocatalytic Hydrogen Production	Huiqing Fan	Northwestern Polytechnical University	Oral	14:15 – 14:30
3	Carbon Reduction Strategies for High-Performance Lightweight Concrete towards Modular Integrated Construction Applications	Jianxin Lu	The Hong Kong Polytechnic University	Oral	14:30 – 14:45
4	Rheological Behavior and Structural Evolution of Blast Furnace Slag-Based Alkali-Activated Paste with SAP	Dengwu Jiao	City University of Hong Kong	Oral	14:45 – 15:00
5	A Brief Talk on the Inorganic Nanoparticle Additives in Sulphoaluminate Cement from Solid Waste-Taking TiO_2 and $CaCO_3$ as Examples	Fangjie Pang	Southeast University	Flash	15:00 – 15:05
6	Particle Packing Model of High Content Phosphogypsum Cementitious Materials with Dense Structure and High Surface Active Reaction	Zhengkang Yu	Wuhan University of Technology	Flash	15:05 – 15:10
7	Preparation of In Situ Nano-Silica with Controlled Yield Percent for Improving Cement Pastes Performance	Saqib Iqbal	Southeast University	Flash	15:10 – 15:15
8	The Solidification of Pb, Zn and Cd by Spontaneous Combustion Gangue Geopolymer and the Depolymerization and Reconstruction Mechanism	Xiao Han	Dalian University of Technology	Flash	15:15 – 15:20
9	Synthesis of Vaterite via Wind-Suspended Carbonation	Kuizhou Liu	Hunan University	Flash	15:20 – 15:25
10	Development of Value-added Aerogel from Waste Glass by CO_2 Extraction for Lightweight Insulating Concrete: Towards Energy Conservation in Buildings	Xudong Zhao	The Hong Kong Polytechnic University	Flash	15:25 – 15:30

Day 2: 13 December 2024 (Friday)					
Session D2	**Mineral Carbonation Materials as SCMs**				**Room Z207**
Chairmen	**Martin Cyr (Toulouse University)** **Jiangshan Li (Chinese Academy of Sciences)**				14:00 – 15:30
1	Enhancing Internal Curing in Alkali-Activated Slag with Superabsorbent Polymer and Limestone Powder	Bo Li	University of Nottingham Ningbo China	Oral	14:00 – 14:15
2	Development of Low-Carbon Concrete Materials by Reusing the Fine Fraction of Concrete Waste	Xiaoliang Fang	Ningbo University	Oral	14:15 – 14:30
3	Hydration Behavior of Carbonated Waste Paste Calcined Clay Cement	Qing Liu	National University of Singapore	Oral	14:30 – 14:45
4	Correlation between Strength and Non-Destructive Ultrasonic Measurements on Early Age Carbonated BOF Slag	Winnie Franco Santos	Eindhoven University of Technology	Oral	14:45 – 15:00
5	Turning MSWI Bottom Ash into Valuable SCM via a Combination of Alkaline Activation and Early-age Ambient-Pressure Carbonation Curing	Zhe Yu	City University of Hong Kong	Flash	15:00 – 15:05
6	Comparison of Evaluation Methods for Pozzolanic Reactivity of Steel Slag with and without Carbonation	Yuanyuan Shen	Hunan University	Flash	15:05 – 15:10
7	A Novel Internal Carbonation Method for Utilization of Steel Slag-Based Binder: Strength, Microstructure, and In-Situ Carbon Migration	Weiwei Chen	The Hong Kong Polytechnic University	Flash	15:10 – 15:15
8	Development of Reactive Carbonate-Calcined Clay-Cement (C4) Composites through Synchronizing Aluminate-Carbonate Reaction: Toward High Compressive Strength and Low Carbon Emission	Yingliang Zhao	The Hong Kong Polytechnic University	Flash	15:15 – 15:20
9	Development of Highly Active Calcium Carbonate through Anhydrous Carbonation: Influence on the Performance and Hydration of Sulfoaluminate Cement-based Materials	Kai Cui	The Hong Kong Polytechnic University	Flash	15:20 – 15:25
10	Synergistic Effect of Pozzolanic Activity of Recycled Red Brick Fines and Carbonated Recycled Concrete Fines as Highly Active Supplementary Cementitious Material	Yong Zheng	The Hong Kong Polytechnic University	Flash	15:25 – 15:30

Day 2: 13 December 2024 (Friday)					
Session D3	**Durability of CO_2 Enabled Concrete**				**Room Z209**
Chairmen	**Chul-Woo Chung (Pukyong National University)** **Yunhua Zhang (Hubei University of Technology)**				14:00 – 15:30
1	CO_2-Induced Corrosion and Bonding Strength Evolution of the Steel-Concrete Interface Exposed to CO_2 up to 1000 kPa Partial Pressure	Liwei Zhang	Chinese Academy of Sciences	Oral	14:00 – 14:15
2	The Improvement of Corrosion Resistance of Wet-cast Concrete subjected to Early-age Ambient Pressure Carbonation Curing	Xiangping Xian	City University of Hong Kong	Oral	14:15 – 14:30
3	Effect of Carbonated Fine Recycled Concrete Aggregate on Durability	Chao Qun Lye	National University of Singapore	Oral	14:30 – 14:45
4	Durability Investigation of Concrete Containing Carbon Capture and Utilization (CCU) Materials	Kumar Avadh	Kajima Corporation	Oral	14:45 – 15:00
5	Damage Evolution and Fracture Mechanism of Concrete with Full Carbonated Recycled Aggregates	Yuxiang Tang	Changsha University of Science and Technology	Oral	15:00 – 15:15
6	Study on Dynamic Mechanical Behavior and Damage Evolution Mechanism of Fiber Reinforced Cemented Tailings Backfill	Shizhuo Zou	University of Science and Technology Beijing	Flash	15:15 – 15:20
7	Prediction and Optimization Design of Concrete Chloride Diffusion Coefficient based on Machine Learning Approach	Yiwei Zhang	Southeast University	Flash	15:20 – 15:25
8	Impregnate Carbonation: CO_2-Guided In Situ Growth of Robust Superhydrophobic Structures on Concrete Surfaces	Long Jiang	The Hong Kong Polytechnic University	Flash	15:25 – 15:30

Day 2: 13 December 2024 (Friday)					
Session D4	**Life Cycle Analyses and Quantification of CO_2 Uptake**				**Room Z211**
Chairmen	**Shin-ichi Igarashi (Kanazawa University)** **Maciej Zajac (Heidelberg Materials AG)**				14:00 – 15:30
Invited Speech: Carbon Sequestration through Concrete Carbonation: Enhancing Low-Carbon and High-Performance Concrete for a Sustainable Built Environment **Sze-dai Pang, National University of Singapore**					14:00 – 14:20
1	Carbon Dioxide Emission Reduction Benefits and Cost Savings Calculation for the Utilization of Recycled Aggregate from Highway Demolition	Ming Yang	China Communications Construction Co., Ltd.	Oral	14:20 – 14:35
2	The Negative Emission Potential of Industrial Solid Wastes: Carbonation Efficiency Evaluation and Constraints in CO_2 Reduction	Yikai Liu	University of Grenoble Alpes and University of Savoie Mont Blanc	Oral	14:35 – 14:50
3	Carbon Neutral Potential of the Concrete Recycling Process through CO_2 Sequestration from Flue Gases	Svetlana Besklubova	The University of Hong Kong	Oral	14:50 – 15:05
4	A Potential Carbon Sink: Recycled Aggregate Stockpiles	Yunlu Hou	Chinese Academy of Sciences	Oral	15:05 – 15:20
5	Carbonated Recycled Concrete Powder as an Alkali-Activated Binder: Performance Optimization and Environmental Evaluation	Wenjing Zhao	Tongji University	Flash	15:20 – 15:25
6	Estimation of CO_2 Capture through Concrete Weathering Carbonation in Mainland China in the Past 30 Years	Xin Shao	Hunan University	Flash	15:25 – 15:30

Conference Venue

Conference Venue:
Podium, Block Z
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

Welcome Reception Venue:
Alumni Atrium
1/F., Chung Sze Yuen Building (Core A)
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

Conference Lunch Venue:
Ju Yin House (聚賢樓)
4/F., Communal Building
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

Conference Banquet Venue:
Harbour Cruise – Bauhinia (洋紫荊維港遊)

Cultural Experience Tour

This tour allows participants to experience the hiking culture in Hong Kong.

Date: 14 December 2024 (Sat)
Venue: Dragon's Back, Shek O

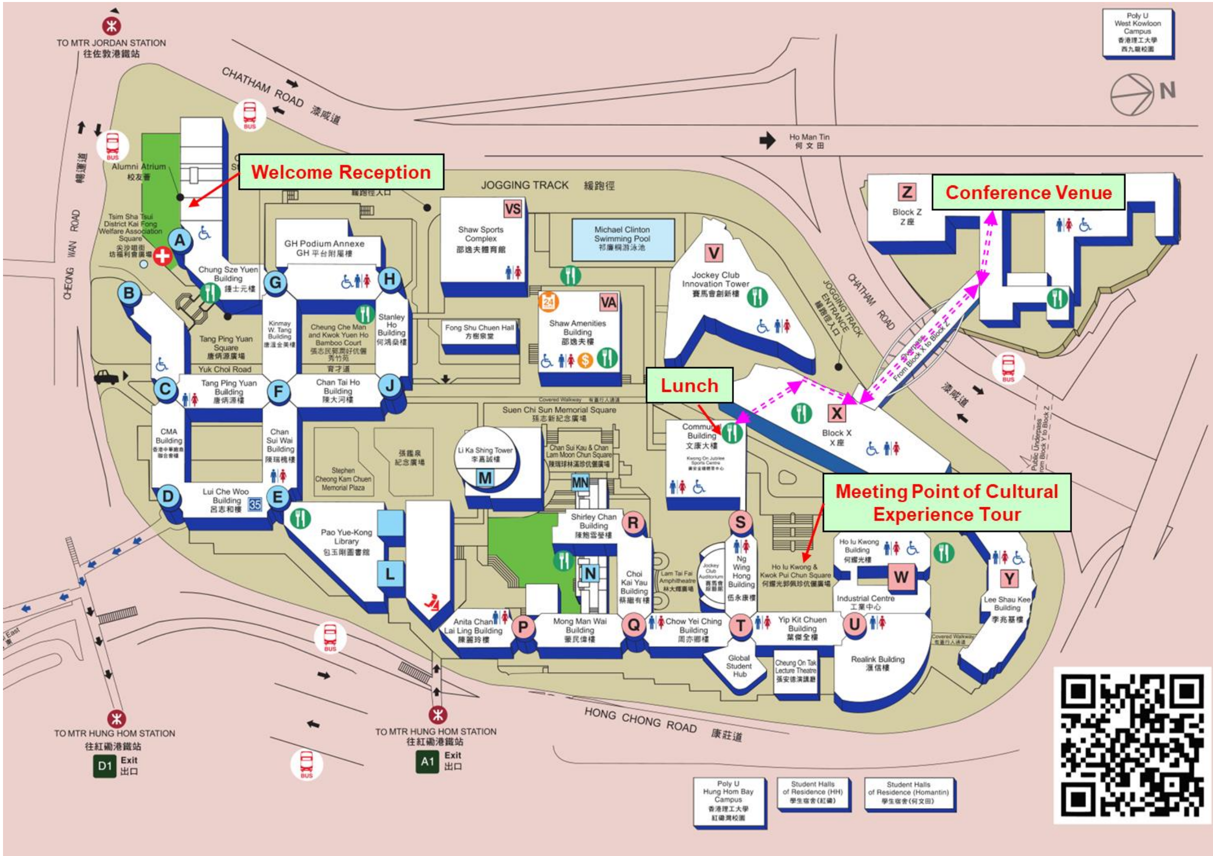
09:15 am	Assemble at Podium, Block W, The Hong Kong Polytechnic University
09:30 am	Depart from The Hong Kong Polytechnic University
10:00 am	Hike at Dragon's Back trail (from Point 5 to Point 1)
~ 12:30 pm	Dismiss at To Tei Wan (Point 1) *(Participants can take bus No. 9 from To Tei Wan bus stop to Shau Kei Wan Bus Terminus and then walk to the MTR Shau Kei Wan Station.)*

Meeting Point: Podium, Block W, The Hong Kong Polytechnic University

Dragon's Back, Shek O

Conference Proceedings

The conference proceedings can be downloaded here.


Welcome Reception
Conference Venue
Lunch
Meeting Point of Cultural Experience Tour
TO MTR JORDAN STATION
往佐敦港鐵站
CHATHAM ROAD 漆咸道
CHEONG WAN ROAD 暢運道
Ho Man Tin 何文田
JOGGING TRACK 緩跑徑
JOGGING TRACK ENTRANCE 緩跑徑入口
HONG CHONG ROAD 康莊道
Alumni Atrium 校友薈
Tsim Sha Tsui District Kai Fong Welfare Association Square
Chung Sze Yuen Building 鍾士元樓
GH Podium Annexe GH 平台附屬樓
Shaw Sports Complex 邵逸夫體育館
Michael Clinton Swimming Pool 祁廉桐游泳池
Jockey Club Innovation Tower 賽馬會創新樓
Block Z Z座
Block X X座
Tang Ping Yuan Square 唐炳源廣場
Yuk Choi Road 育才道
Kinmay W. Tang Building
Cheung Che Man and Kwok Yuen Ho Bamboo Court
Stanley Ho Building 何鴻燊樓
Fong Shu Chuen Hall 方樹泉堂
Shaw Amenities Building 邵逸夫樓
Tang Ping Yuan Building 唐炳源樓
Chan Tai Ho Building 陳大河樓
Suen Chi Sun Memorial Square 孫志新紀念廣場
Community Building 文康大樓
CMA Building
Chan Sui Wai Building 陳瑞槐樓
Stephen Cheong Kam Chuen Memorial Plaza
張鑑泉紀念廣場
Li Ka Shing Tower 李嘉誠樓
Chan Sui Kau & Chan Lam Moon Chun Square
Lui Che Woo Building 呂志和樓
Pao Yue-Kong Library 包玉剛圖書館
Shirley Chan Building
Choi Kai Yau Building 蔡繼有樓
Lam Tai Fai Amphitheatre 林大輝廣場
Jockey Club Auditorium
Ng Wing Hong Building 伍永康樓
Ho Iu Kwong & Kwok Pui Chun Square
Ho Iu Kwong Building 何耀光樓
Industrial Centre 工業中心
Lee Shau Kee Building 李兆基樓
Anita Chan Lai Ling Building 陳麗玲樓
Mong Man Wai Building 蒙民偉樓
Chow Yei Ching Building 周亦卿樓
Yip Kit Chuen Building 葉傑全樓
Realink Building 滙信樓
Global Student Hub
Cheung On Tak Lecture Theatre 張安德演講廳
Covered Walkway 有蓋行人通道
Public Underpass From Block Y to Block Z
Footbridge From Block X to Block Z
TO MTR HUNG HOM STATION
往紅磡港鐵站
D1 Exit 出口
A1 Exit 出口
Poly U Hung Hom Bay Campus 香港理工大學紅磡灣校園
Student Halls of Residence (HH) 學生宿舍(紅磡)
Student Halls of Residence (Homantin) 學生宿舍(何文田)
Poly U West Kowloon Campus 香港理工大學西九龍校園
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