

Summary report on the 11th 3R International Scientific Conference on Material Cycles and Waste Management (3RINCs 2025)

I. Introduction

The 11th 3R International Scientific Conference on Material Cycles and Waste Management (3RINCs2025) was successfully held on 11–13 May 2025 in Jeju, Republic of Korea, organized by the Korea Society of Waste Management (KSWM), in collaboration with the Japan Society of Material Cycles and Waste Management (JSMCWM) and other international partners.

Hosted at the Jeju Shinhwa World Landing Convention Centre, the conference brought together leading experts, researchers, policymakers, and industry professionals from around the world to address the theme:

“Paradigm Shift to Closing the Loop – Net Zero and Circular Economy.”

The event emphasized sustainable waste management, the role of the 3Rs (Reduce, Reuse, Recycle), resource circulation, and technological innovation for achieving carbon neutrality and circularity.

The 11th 3RINCs 2025 convened researchers, practitioners, and policymakers from across Asia, Oceania, North America, and Africa to advance circular economy strategies and carbon-neutral waste management. The conference registered 619 participants from 16 countries and showcased 348 papers (208 oral across general, special, and convener-led sessions; 140 posters). Fifty-eight presentations received Outstanding Presentation Awards (30 oral; 28 posters).

➤ The 11th 3RINCs 2025 at a Glance

Metric	Outcome
Total participants	619 registered delegates
Countries represented	16
Papers presented	348 (208 oral; 140 poster)
Awards	58 Outstanding Presentation Awards (30 oral; 28 poster)
Program structure	Plenary keynotes; 9 Special Sessions; 7 Convener-led Sessions; General Oral & Poster Sessions; Networking; Technical Tour

➤ More information is shown in the following links.

- Homepage: <https://3rincs2025.or.kr/>
- Program: https://3rincs2025.or.kr/down/program_book/index.html

II. Conference Overview

- Date: May 11–13, 2025
- Venue: Jeju Shinhwa World, Jeju, Republic of Korea
- Organizers: KSWM, JSMCWM, with support from Ministry of Environment Korea, Jeju Province, and multiple international institutions
- The conference consisted of:
 - Plenary (Keynote) Sessions
 - Special Sessions (9 categories)
 - Convener-led Sessions (7 categories)
 - Oral Presentations (multiple thematic streams)
 - Poster Sessions
 - Networking & Cultural/Technical Tours



III. Keynote Session (12 May)

The keynote session (May 12) featured six distinguished speakers, addressing national and global strategies for waste management, carbon neutrality, and circular economy:

- Mr. Oh Young-Hoon (Governor, Jeju): 2040 Plastic Zero Jeju and Carbon Neutrality

- Prof. Jinwon Park (Yonsei University): Recovery of Resources from Solid Waste for Carbon Neutralization
- Prof. Hua Zhang (Tongji University, China): AI & Machine Vision for Solid Waste Identification
- Prof. Fan Lü (Tongji University, China): Waste Biorefinery: Biogas to BioX
- Mr. Tatsuki Kado (Suntory Holdings, Japan): Sustainable Packaging Initiatives

IV. Special Sessions— Highlights

Special Session 1 & 2: Achieving Net-Zero in the Cement Industry through Circular Economy

These sessions explored pathways for decarbonization in the cement sector, covering national and international case studies, legal frameworks, and advanced recycling strategies. Topics included Korea’s carbon neutrality roadmap, net-zero concrete development in Australia, EU and Japanese approaches, and China’s sustainable transition. The overall theme emphasized low-carbon innovation, international cooperation, and industry-wide transformation for net-zero cement production.

Special Session 3 & 4: Waste-to-Energy Expert Training Program – Student Research Presentations

These sessions provided a platform for graduate students and young researchers to showcase cutting-edge research on waste-to-energy technologies. Presentations addressed greenhouse gas reduction filters, advanced sludge digestion methods, pyrolysis and biochar applications, plasma alternatives for ozone treatment, and AI-based methane yield forecasting. The theme was nurturing next-generation experts and advancing technical solutions for waste-to-energy conversion.

Special Session 5: From Global Challenges to Local Solutions – Policy-Driven Innovations in Plastic Waste Management

This session highlighted international experiences in policy development for plastic waste management. Presentations examined Extended Producer Responsibility (EPR) in Vietnam, Canada’s multi-level approach, urban challenges in Cambodia, grassroots initiatives in Ecuador, and the implications of global plastic treaty negotiations. The core theme was policy innovation, cross-country learning, and multilateral cooperation in tackling plastic waste.

Special Session 6: Sustainable Waste Management and Battery Utilization

This session focused on recycling and upcycling of electronic waste and batteries. Topics included UV degradation of plastics, PET pyrolysis analysis, e-waste policy in ASEAN, risk assessment of lithium-ion batteries, and advanced upcycling of cathode materials. The overarching theme was developing safe, efficient, and circular systems for e-waste and battery resource recovery.

Special Session 7 & 8: WEEE I & II – E-Waste Management towards a Circular Economy

These sessions addressed current practices, material flow analysis, and regulatory frameworks in managing waste electrical and electronic equipment (WEEE). Japan and Korea’s collection/recycling systems, battery recycling in Japan, and Korea’s eco-assurance system reforms were presented. Discussions also included infrastructure strategies and international panel debates. The joint theme emphasized advancing circular economy models for electronic waste and strengthening governance frameworks.

Special Session 9: Jaipur Declaration on 3R & Circular Economy (2025–2035)

This session introduced the Jaipur Declaration, setting ambitious regional goals for Asia-Pacific to achieve resource efficiency and low-carbon societies. Presentations addressed global policy reshaping, EPR for plastics, circular economy potential in Nepal’s cement industry, and broader CE policy frameworks. The theme was establishing a long-term regional roadmap for sustainable 3R and circular economy transitions in Asia-Pacific.



V. Convener Sessions— Highlights

Convener Session 1: Mercury Waste Stabilization (Prof. Reiko Sodeno, Shibaura Institute of Technology, Japan)

This session examined global strategies for managing mercury waste under the Minamata Convention. Presentations focused on surplus mercury stabilization, international initiatives,

and treatment technologies in Japan and Korea. The theme emphasized long-term, environmentally sound management systems for hazardous mercury waste.

Convener Session 2: AI Solutions in Waste Management (Prof. Sangchul Lee, Korea University)

The session highlighted applications of artificial intelligence and machine learning in optimizing waste management. Topics included AI-driven waste classification, predictive modeling for anaerobic digestion, gasification optimization, and data-driven decision support systems. The core theme was leveraging AI and digital technologies to enhance efficiency and sustainability in waste management.

Convener Session 3: Advances in Pyrolysis Technologies for Waste and Biomass Valorization (Prof. Young-Kwon Park, University of Seoul)

This session focused on technological innovations in pyrolysis for converting waste and biomass into valuable products such as bio-oil, syngas, and biochar. Presentations addressed catalytic methods, co-processing of plastics and biopolymers, and process optimization. The overarching theme was pyrolysis as a key circular economy technology for resource recovery and renewable energy production.

Convener Session 4: Carbon Capture in Solid Waste Management (Profs. In-Hee Hwang & SangYul Kim, Korea)

Speakers introduced carbon capture technologies in the context of solid waste management. Topics included integrating carbon sequestration into incineration, landfill gas treatment, and innovative sorbent development. The session emphasized reducing greenhouse gas emissions from solid waste systems through advanced carbon capture strategies.

Convener Session 5 & 6: Innovations in Environmental & Energy Research (Prof. Tomonori Ishigaki & Prof. Sirintornthep Towprayoon, and Prof. Hyunchul Oh)

Two sessions showcased interdisciplinary research at the intersection of environment, energy, and waste management. Presentations ranged from renewable energy applications and bioresource valorization to environmental monitoring. The theme was fostering innovation through cross-cutting approaches that integrate waste management, energy recovery, and environmental science.

Convener Session 7: Nitrogen Management (Prof. Misuzu Asari, Research Institute for Humanity and Nature, Japan)

This session explored strategies to address nitrogen pollution and its environmental impacts. Presentations covered nitrogen cycle analysis, treatment technologies, and case studies in waste and wastewater systems. The session emphasized sustainable nitrogen management for environmental protection and resource recovery.



VI. Scientific Sessions

The General Oral Presentation sessions at 3RINCs 2025 consisted of 127 oral presentations, delivered across parallel streams in eight different session rooms at the Jeju Shinhwa World Landing Convention Centre. The oral sessions covered a broad spectrum of themes, ranging from innovative waste management technologies and circular design to wastewater treatment, biomass-to-biogas technologies, and investment strategies in the circular economy.

The Poster Sessions featured 140 presentations, exhibited in the foyer adjacent to Landing Ballroom C. Posters were displayed from May 11 to May 12, with a dedicated discussion and evaluation period on May 12 (09:00–10:00). This interactive format encouraged active exchange between presenters and participants, especially among early-career researchers. Outstanding oral and poster presentations were recommended for the Outstanding Presentation Awards, ensuring recognition of academic excellence.

Together, these sessions provided more than 260 presentations, serving as the backbone of scientific exchange at the conference.

[Oral Presentation Sessions]

Code	Session Title
O1A / O1B	Innovative Technologies in Waste Management I, II
O2A	Circular Design & Life Cycle Management
O3A	Circular Economy & Investment
O4A / O4B	Waste Prevention & Minimization I, II
O5A	Close-loop on End-of-batteries and -electronics
O6A	Close-loop in Plastics
O7A / O7B / O7C	Biomass-to-biogas Technologies I, II, III
O8A / O8B / O8C	Innovations in Environmental & Energy Research I, II, III
O9A / O9B	Wastewater and Sludge Treatment I, II

[Poster Presentation Sessions]

Code	Session Title
P1	Innovative Technologies in Waste Management
P2	Circular Design & Life Cycle Management
P3	Circular Economy & Investment
P4	Waste Prevention & Minimization
P5	Close-loop on End-of-batteries and -electronics
P6	Close-loop in Plastics
P7	Biomass-to-biogas Technologies
P8	Innovations in Environmental & Energy Research
P9	Wastewater and Sludge Treatment



VII. Networking, Cultural Program, and Technical Tour

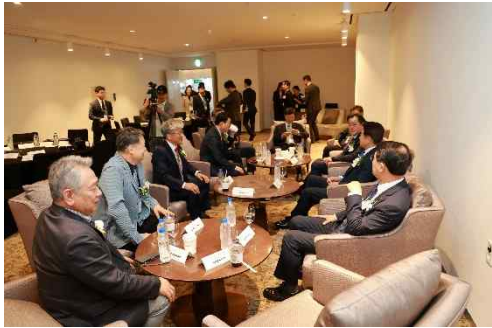
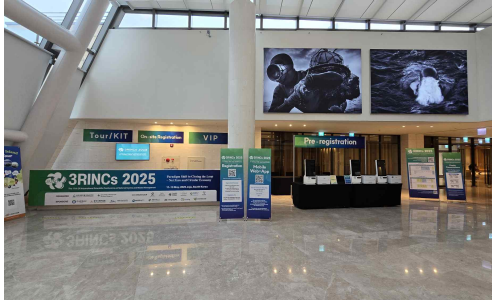
The Welcome Party(11 May): The Welcome Party held on May 11 offered a warm and convivial opening to the conference. Attendees enjoyed wine while listening to welcoming remarks by President Seok-wan Kim of KWSE and Chairman Jae Hac Ko of the 3RINCs Organizing Committee, followed by congratulatory messages from representatives of various participating countries.

The Gala Dinner(12 May): At the Gala Dinner on May 12, the evening commenced with a captivating performance by the ‘Gukak-Jazz’ band led by Lee Kang, which artfully blended traditional Korean music with jazz elements. The gathering continued with toast speeches and congratulatory messages delivered by the sponsors of 3RINCs, reflecting both celebration and gratitude for their support.

“At the Gala Dinner, the host country for the 12th 3RINCs to be held next year was announced as Thailand.”

The Technical Tour(13 May): The Technical Tour on May 13 took participants to the Jeju Environmental Resources Recycling Center, a modern facility that has been operating since 2020. The center treats municipal solid waste generated on Jeju Island through incineration and

final landfill disposal, while also recovering energy from waste. Delegates learned how the facility was designed to enable self-sufficient waste treatment within Jeju and to serve as both an environmental education site and a community hub.





Committee



President of Korea Society of Waste Management
Prof. Seok-Wan Kim
Daegu Haany University



Chairman of the 3RINCs 2025 Organizing Committee
Prof. Jae Hac Ko
Jeju National University



Prof. Young-Soo Han
Chungnam National University



Prof. Daegi Kim
Mokpo National University



Prof. Doyeon Lee
Hanbat National University



Prof. Hyunjung Lee
Jeju National University



Prof. Sang-Hyoun Kim
Yonsei University



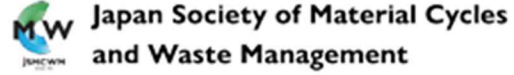
Prof. Hyun-Woo Kim
Jeonbuk National University



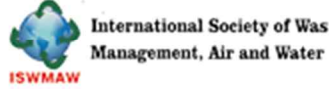
Prof. Xin Zhao
Seoul National University

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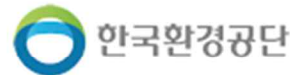
ORGANIZER



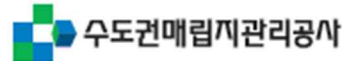
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