

nature conferences

Waste management and valorisation for a sustainable future

Venue: ISC Building, LC Science Park, Seoul, South Korea

Date: October 26-28, 2021

* =Virtual Presenter

Oct 26th, 2021

08:00 a.m. ~

Registration

09:00 a.m. ~ 9:30 a.m. Opening and welcoming remarks

Fabio Pulizzi (Chief Editor of Nature Nanotechnology)

Yong Sik Ok (Chairman of Nature Conference)

Lim Hyesook (Minister of Ministry of Science and ICT, Korea)

Jin Taek Chung (President of Korea University, Korea)

Woo Kyun Lee (Director of OJEong Resilience Institute,
Korea University, Korea)

Session I: Sustainable waste management

The development of sustainable waste management strategies is a major challenge throughout the world. This session will focus on the social and environmental impact of hazardous and non-hazardous wastes, recycling and recovery of waste materials, and the development of a circular economy. The session will also consider the unsustainable waste management that currently surrounds the COVID-19 pandemic.

Chair: **William Mitch** (Stanford University, USA)

Woo Kyun Lee (Korea University, Korea)

09:30 a.m. ~ 10:30 a.m. *Dilemma's in Waste Management and Resource Reuse*

***Keynote: Marian Chertow** (Yale University, USA)

10:30 a.m. ~ 11:00 a.m. *Beneficial uses of waste materials in the built environment*

***Elsa Olivetti** (Massachusetts Institute of Technology, USA)

11:00 a.m. ~ 11:30 a.m. *Moving Towards Circular Materials Management in Coastal Cities*

***Jenna Jambeck** (University of Georgia, USA)

11:30 a.m. ~ 12:30 p.m. **Oral Presentations**

Re-thinking electrochemical systems for water treatment: reductive systems, inexpensive materials, and high concentration targets

William Mitch (Stanford University, USA)

Global sustainable waste management

Jörg Rinklebe (Bergische University of Wuppertal, Germany)

Creating new value of iron slag as soil amendment to mitigate methane emission and Improve Rice Cropping Environments

Pil Joo Kim (Gyeongsang National University, Korea)

Feasibility demonstration of decentralized waste plastic pyrolysis and biomass heating cogeneration process

Boris Brigljević (UNIST, Korea)

12:30 p.m. ~ 2:00 p.m. Lunch and network

Session II: Micro(nano)plastics in the environments

Micro(nano)plastics are small plastic particles, including plastic fragments, fibres, and beads. Products containing such materials are typically discarded after use, which has led to the accumulation of micro(nano)plastics in the environment, where they can persist for years due to their durability. This session will highlight the production of micro(nano)plastics worldwide and how over 80% of marine plastic litter is thought to have originated from mismanaged land-based waste. It will examine the impact of micro(nano)plastics on terrestrial and aquatic ecosystems, and also humans, and propose solutions such as prevention, recycling and reuse via the sustainable use of biodegradable plastics.

Chair: **Jörg Rinklebe** (Bergische University of Wuppertal, Germany)

In-Joo Chin (Inha Technical College, Korea)

2:00 p.m. ~ 2:30 p.m. *Recent advances in plastic waste recycling and valorisation: Case studies from Asia*

***Carol S.K. Lin** (City University of Hong Kong, Hong Kong)

2:30 p.m. ~ 3:00 p.m. *Small(er) plastics, big(ger) problem? Fate, transport and implications of nano- and microplastics in the environment*

***Denise Mitrano** (ETH Zurich, Switzerland)

3:00 p.m. ~ 3:30 p.m. *Aligning recycling and manufacturing: SMaRT MICROfactoriesTM creating sustainable materials and products from plastic waste*

***Veena Sahajiwalla** (UNSW Sydney, University of New South Wales, Australia)

3:30 p.m. ~ 4:30 p.m. **Oral Presentations**

The prominent benefit of furanoates as a substituent for biodegradable terephthalates

Jun Mo Koo (Korea Research Institute of Chemical Technology, Korea)

Bio-based macro - and micro plastics designed for specific industrial applications

Dongyeop Oh (Korea Research Institute of Chemical Technology, Korea)

Fast microplastics (0.3-5 mm) identification as potential option for monitoring studies

***Cristiane Vidal** (University of Campinas - UNICAMP, Brazil)

Sustainable super engineering plastics from biomass-derived isosorbide against bisphenol- a based plastics for overcoming various properties

Jeyoung Park (Korea Research Institute of Chemical Technology, Korea)

4:30 p.m. ~ 6:00 p.m. Poster Session with Refreshments

Oct 27th, 2021

08:00 a.m. ~ Registration

8:50 a.m. ~ 09:00 a.m. Welcoming remarks:

William Mitch (Stanford University, USA)

Yoon-Seok Chang (Pohang University of Science and Technology, Korea)

Session III: Electronic waste and circular economy

Hazardous electronic waste (e-waste), which is present in the environment due to improper disposal and recycling, is a global problem that demands urgent action. This session will examine the latest sustainable materials, non-toxic substitutes and recycling technologies, as well as regulatory models that can help reduce the environmental impact of electronic waste. The session will also explore energy systems, which are an important and connected component of the issues surrounding electronics and sustainability.

Chair: **Stéphane Guilbert** (Montpellier SupAgro, France)

Hankwon Lim (Ulsan Institute of Science and Technology, Korea)

9:00 a.m. ~ 9:30 a.m. *Sustainable management of an evolving e-waste stream*

***Callie Babbit** (Rochester Institute of Technology, USA)

9:30 a.m. ~ 10:00 a.m. *Sustainable material solutions that scale toward zero E-Waste*

***Oladele Ogunseitan** (University of California, Irvine, USA)

10:00 a.m. ~ 10:30 a.m. *Global energy transitions and innovation mechanisms for a sustainable economy*

***Jessika Trancik** (Massachusetts Institute of Technology, USA)

10:30 a.m. ~ 11:00 a.m. Coffee Break

11:00 a.m. ~ 12:00 p.m. **Oral Presentations**

Fully biodegradable electronics for achieving zero-waste

Seung-Kyun Kang (Seoul National University, Korea)

Sustainable policy framework of emerging E-wastes in Korea during the transition to the fourth industrial revolution

Jungkeun Oh (National Institute of Environmental Research, Korea)

Impedance based prognostics as an efficient way for sorting and echelon utilization of spent lithium batteries

Vijay Mohan Nagulapati (UNIST, Korea)

Effect of rice husk biochar on lead dynamics and bacterial phylotype composition in solar cell waste-contaminated soil

Pavani Dissanayake (Korea University, Korea)

12:00 p.m. ~ 2:00 p.m. Lunch and network

Session IV: Reducing, recycling and recovery of agricultural and food waste

Agricultural waste residues can be a reliable source of sustainable fuel. Annual global postharvest loss of these edible food crops is estimated at 1.3 billion metric tons and food loss limits society's ability to sustain on a large production scale. Thus, the use of agricultural and food waste as precursors for the production of other value-added substances, such as biochar, is of increasing interest and could provide a way to combat waste disposal problems in the agricultural sector. This session will explore the diversified agricultural residue and food waste by handling (and production strategies involved for) the solid waste transformation into usable products. It will also highlight waste generation phases from harvesting, transportation, processing, and distribution to storage.

Chair: **Johannes Lehmann** (Cornell University, USA)

Sang-Hyoun Kim (Yonsei University, Korea)

2:00 p.m. ~ 2:30 p.m. *Circular economy in urban food systems toward net-zero carbon cities: case studies from USA & India*

***Anu Ramaswami** (Princeton University, USA)

2:30 p.m. ~ 3:00 p.m. *Circular economy driven sustainable composites*

***Amar Mohanty** (University of Guelph, Canada)

3:00 p.m. ~ 3:30 p.m. *A sustainable carbon-neutral future aided by waste management and AI*

***Xiaonan Wang** (Tsinghua University Beijing, China)

3:30 p.m. ~ 4:00 p.m. *Waste to resources towards environmental sustainability in Megacities*

***Yinghong Peng** (Shanghai Jiao Tong University, China)

4:00 p.m. ~ 4:30 p.m. **Oral Presentations**

State-of-the-arts technology for food waste valorization

Sang-Hyoun Kim (Yonsei University, Korea)

Sustainable urban food systems with optimum reduction and recycling of food waste: A foresight 2035 study to bring out the research priorities

Stéphane Guilbert (Montpellier SupAgro, France)

4:30 p.m. ~ 5:00 p.m. Poster Session with Refreshments

5:00 p.m. ~ 6:00 p.m. **Meet the Editor**

Monica Contestabile (Chief Editor, Nature Sustainability),

Owain Vaughan (Chief Editor, Nature Electronics)

6:30 p.m. ~ 8:30 p.m. Conference Banquet

Oct 28th, 2021

8:00 a.m. ~ Registration

8:50 a.m. ~ 09:00 a.m. Welcoming remarks:

Kim Chan-Woo (Ministry of Foreign Affairs, Korea)

Christopher Tremewan (APRU)

Session V: Biomass valorisation: waste to resources

Biomass valorisation has been a major focus of research in the past few years. Different types of biomass used as feedstocks (such as forestry residue, wheat straw, etc.) are disposed through burning. This session will cover strategies to transform different types of biomass into value-added products (such as biochar) that can be applicable to other chemical or biological processes. Fuels, gases and value chemicals are obtained from biomasses through a thermochemical process that includes gasification, pyrolysis and refining. This session will provide a comprehensive picture on the outlook and potential of using biomass for energy and various other sectors.

Chair: **Ange Nzihou** (RAPSODEE Research Center, IMT Mines Albi, France)

Dong-Kwon Lim (KU BK21 FOUR R&E Center for Bio-Innovative-Advanced Materials, Korea)

9:00 a.m. ~ 9:30 a.m. *Innovative approaches to turn agricultural waste into ecological and economic assets- The NOAW Project*

Natalie Gontard (INRAE, France)

9:30 a.m. ~ 10:00 a.m. *Unravel mechanisms between the carbon and metal species towards biographenic-like materials*

Ange Nzihou (RAPSODEE Research Center, IMT Mines Albi, France)

10:00 a.m. ~ 10:30 a.m. *The role of LCA in sustainable waste management*

***Thomas H. Christensen** (Technical University of Denmark, Denmark)

10:30 a.m. ~ 11:30 a.m. **Oral Presentations**

Environment vs Health: The cruel choice in the midst of the pandemic

Jaewook Myung (KAIST, Korea)

Hybrid based composite phase change materials-integrated latent heat storage system for sustainable future

Dimberu Geremew Atinafu (Yonsei University, Korea)

Food waste biochar as a renewable fuel: A case study of Korea

Yoonah Jeong (KICT, Korea)

Development of high-selectivity caproate production and residual carbon source recovery platform

Byung-Chul Kim (Seoul National University, Korea)

11:30 p.m. ~ 12:30 p.m. Poster Session with Refreshments

12:30 p.m. ~ 2:00 p.m. Lunch and network

Session VI: Governmental policy on waste management and valorisation

This session will examine the operation, design and construction of several waste management systems. These include landfill and leachate systems, waste-to-energy (WTE) facilities and other commercial systems that involve a cradle-to-grave strategy for waste management. Moreover, there is potential for growth in management systems through proper life-cycle assessment, leading to newer, cleaner and improved energy recovery technologies that utilize the wastes highlighted in previous sessions: plastic waste, electronic waste, and food and agricultural waste. The session will also consider commercialization aspects and the development of strategic goals that can deliver strong policy and legislation.

Chair: **Natalie Gontard** (INRAE, France)

Joo Young Park (Korea University, Korea)

2:00 p.m. ~ 2:30 p.m. *Circular Bio-Nutrient Economy: sustainability at the nexus of fertilizer-food-feces*

Johannes Lehmann (Cornell University, USA)

2:30 p.m. ~ 3:30 p.m. *Overshot and overwhelmed global waste management policy system: How to address global waste valorisation challenges in the COVID19 era?*

***Keynote: Nazia Mintz Habib** (University of Cambridge, UK)

3:30 p.m. ~ 4:00 p.m. *Urban waste futures*

***John E. Fernández** (Massachusetts Institute of Technology, USA)

4:00 p.m. ~ 5:00 p.m. **Oral Presentations**

Research on resource circulation policies in the post -COVID-19 era

Sora Yi (Korea Environment Institute, Korea)

Prospect of South Korea's new plastic waste management policy after the COVID-19

Youngyeul Kang (National Institute of Environmental Research, Korea)

An improved resource circulation strategy for effective waste management toward a circular economy in South Korea

Namil Um (National Institute of Environmental Research, Korea)

The Anthropocene worldview scale: conceptualization and development

Donghun Kang (KAIST, Korea)

5:00 p.m. ~ 5:30 p.m. **Meet the Editor**

Fabio Pulizzi (Chief Editor, Nature Nanotechnology)

5:30 p.m. ~ 6:00 p.m. Concluding remarks

Event Organizers



고려대학교
KOREA UNIVERSITY

Korea University

Korea University is one of the oldest universities in South Korea which was established in 1905. It is a most prestigious higher education institute in Korea and consists of two main branches as Seoul campus and Sejong campus. Korea university is the home to over 36,000 students from all parts of Korea and every corner of the world. In the QS World University Rankings 2020 by Quacquarelli Symonds (QS), Korea University climbed 14 places to 69th place, a notable improvement from the previous year. Korea University has maintained its status as the first among local private universities for six consecutive years.



OJERI @ KU
OJEong
Resilience
Institute

OJEong Resilience Institute, Korea University

Established in 2014, the OJEong Resilience Institute (OJERI) is the center of the Asia resilience research network. OJERI aims to improve ecological resilience for addressing social-ecological changes that threaten the quality of life for humanity, and to contribute to a sustainable society. OJERI cooperates with a 'Institute of Environment and Ecology', a 'Environmental GIS/RS Center', a 'Wild Resource Plant Seed Bank' and a 'Korea Biochar Research Center' to develop new theories and techniques for estimating quantitatively ecological resilience and analyzing impact of the human activities to the ecological resilience. Through this research network, OJERI will become a top-level research institute in the field of sustainability.



APRU
Sustainable Waste
Management

APRU Sustainable Waste Management

The APRU Sustainable Waste Management Program hosted by the Korea University (Prof. Yong Sik Ok) offers a timely opportunity for knowledge exchange among professionals from all over the world to assist the formulation of an efficient sustainable management agenda for biological waste and remediation of soil, water and air in the local context, which satisfies the environmental compatibility, financial feasibility and social needs. It will deliberate on state-of-the-art treatment technologies, advanced management strategies, and political issues pertaining to recycling and recovery of organic waste.

**nature
sustainability**

Nature Sustainability

Launched in January 2018, *Nature Sustainability* is an online-only monthly journal publishing the best research about sustainability from the natural and social sciences, as well as from the fields of engineering and policy. All editorial decisions are made by a team of full-time professional editors.

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Launched in January 2018, *Nature Electronics* is an online-only monthly journal publishing the best research from all areas of electronics, incorporating the work of scientists, engineers and researchers in industry. All editorial decisions are made by a team of full-time professional editors.

**nature
nanotechnology**

Nature Nanotechnology

Nature Nanotechnology is a monthly journal publishing the best research from across nanoscience and nanotechnology. All editorial decisions are made by a team of full-time professional editors.

Scientific Organizing Committee



Prof. Yong Sik Ok (Chairman, Nature Conference)

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Director, APRU Sustainable Waste Management Program
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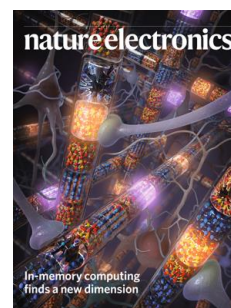
Monica Contestabile

Chief Editor, *Nature Sustainability*
<https://www.nature.com/natsustain/>



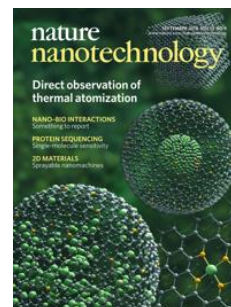
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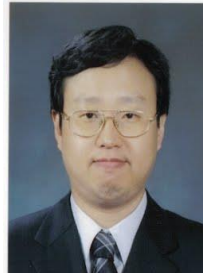
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