

# Report of the Fourth 3R International Scientific Conference on Material Cycles and Waste Management (3RINCs) 2017 in New Delhi, India

3RINCs2017 committee



## 1. Outline

### 1-1. Dates and Venue

The Fourth 3R International Scientific Conference on Material Cycles and Waste Management (3RINCs) was held March 8–10, 2017 at Indian Habitat Center, New Delhi, India.

### 1-2. Organization

- ORGANIZERS:

Council of Scientific and Industrial Research (CSIR), New Delhi, India  
Central Building Research Institute, Roorkee, India  
CSIR-Indian Institute of Petroleum, Dehradun, India  
International Society of Waste Management, Air and Water (ISWMAW)  
Indian Institute of Technology, Delhi

- CO-ORGANIZERS:

Japan Society of Material Cycles and Waste Management (JSMCWM),  
Korea Society of Waste Management (KSWM)

1-3. Official website: <http://www.3rincsindia.org>

## 2. Participants and sponsors

### 2-1. Participants

- Number of 3RINCs Participants: 300
- Number of oral presentations: 100
- Number of poster presentations: 60

## 2-2. Sponsors

- Sponsors, Exhibitors, and Advertisers: 30

### From India:

Oil and Natural Gas Corporation (ONGC), New Delhi, India  
Gas Authority of India Limited (GAIL), India  
National Thermal Power Corporation of India (NTPC), India  
Hindustan Petroleum Corporation Limited (HPCL), India  
Bharat Petroleum Corporation Limited (BPCL), India  
Purple Products Pvt Ltd. (joint with Nomura kohsan Co., Ltd. )

### From Korea

Hanil Cement Co.,Ltd.

### From Japan

Dowa Holdings Co., Ltd.  
JFE Engineering Corporation  
Hitachi Zosen Corporation  
Towa Technology Corporation  
Ebara Environmental Plant Co., Ltd.  
EX Research Institute, Ltd.  
Kawasaki Heavy Industries, Ltd.  
Kobelco Eco-Solutions Co., Ltd.  
Mitsubishi Heavy Industries Environmental & Chemical Engineering Co., Ltd.  
Nippon Steel & Sumikin Engineering Co., Ltd.  
Nomura kohsan Co., Ltd. (joint with Purple Products Pvt Ltd.)  
Plantec Inc.  
Sumiju Environmental Engineering,Co.Ltd.  
Sumitomo Heavy Industries Environment Co., Ltd.  
Takuma Co., Ltd  
Yachiyo Engineering Co., Ltd.  
iTask  
Kokusai Kogyo Co., Ltd.  
Sanyu Plant Service Co., Ltd.  
ShinMaywa Industries, Ltd.  
Taiheiyo Cement Corporation  
Japan Environmental Sanitation Center  
Asia-Pacific Network for Global Change Research Secretariat

### Special financial support

Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE), Viet Nam  
Japan Society of Material Cycles and Waste Management (JSMCWM)



Exhibition of sponsors

### 3. Short Report on the 3RINCs Scientific Program

#### 3-1. Plenary Lectures

Four speakers were invited for the Plenary Lectures.

8 <sup>th</sup> March 9:05-9:30	<p><b>From Waste to Products-Innovating a Carbon Smart Future</b> Dr. Jennifer Holmgren (Chief Executive Officer (CEO), Lanza Tech, USA)</p> <p>Dr. Jennifer Holmgren is the Chief Executive Officer of LanzaTech. Jennifer has over 20 years of experience in the energy sector including a proven track record in the development and commercialization of fuels and chemicals technologies. Prior to joining LanzaTech, she was Vice President and General Manager of the Renewable Energy and Chemicals business unit at UOP LLC, a Honeywell Company. In that role, she led UOP's renewable business from its inception through to the achievement of significant revenues from the commercialization of multiple novel biofuels technologies.</p> <p>Dr. Jennifer Holmgren holds a B.Sc. degree from Harvey Mudd College, a Ph.D. from the University of Illinois at Urbana-Champaign and an MBA from the University of Chicago. She currently serves on multiple external advisory boards. She is the author or co-author of 50 US patents, 20 scientific publications and is the 2003 recipient of the Council for Chemical Research's (CCR) Malcolm E. Pruitt Award.</p>	A portrait of Dr. Jennifer Holmgren, CEO of Lanza Tech, USA. She is a woman with dark hair, wearing glasses and a dark jacket, smiling and resting her chin on her hand. The background shows a blurred image of an industrial facility with a sign that says "capturing carbon".
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<p>8<sup>th</sup> March 9:30-9:55</p>	<p><b>Waste Management in Thailand: Perspective and Challenge</b> Prof. &amp; Dr. Somrat Kerdsuwan (King Mongkut's University of Technology North Bangkok, Thailand)</p> <p>Somrat Kerdsuwan is a Director of the Waste Incineration Research Center and Associate Professor of Department of Mechanical and Aerospace Engineering, Faculty of Engineering, King Mongkut's University of Technology North Bangkok, Thailand. His works deal with the research and development for the clean and green energy from waste and biomass by using advance Thermal Technology which includes pyrolysis, gasification, incineration as well as the relevant pollution abatement. He is an inventor, from laboratory scale to commercial scale. The outreach of his work can contribute into the real application and response to the real needed for sustainable development.</p>	
<p>9<sup>th</sup> March 14:15-14:45</p>	<p><b>The Role of Waste to Energy and its situation in Japan</b> Professor &amp; Dr. Masaki Takaoka (Kyoto University, Japan)</p> <p>Dr. Masaki Takaoka is a professor in Department of Global Ecology, Graduate School of Global Environmental Studies, and in Department of Environmental Engineering, Graduate School of Engineering, Kyoto University, Japan. After graduation of Master course in Department of Environmental and Sanitary Engineering, Kyoto University in 1993, He started working as an assistant professor in the same department. His Doctor of Engineering degree was awarded in 2001 with thesis about removal of mercury in municipal solid waste flue gas. He was promoted to be an associate professor from February, 2002 and to be a professor from January, 2011 in Department of Environmental Engineering, Graduate School of Engineering, Kyoto University. His major subject is Management and Treatment of Solid Waste. Particularly his current research interests include energy from waste, recovery of valuable metal and substances from waste and control of toxic substances such as mercury, persistent organic pollutants, heavy metals, radioactive substances, etc. He is a board member in Japan Society of Material Cycles and Waste Management since 2016, and in sludge management, a specialist group of International Water Association since 2007. He has received a number of awards for his research including Best Paper Awards at the Japan Society of Waste Management Experts in 2000, Japan Society of Atmospheric Environment in 2001, Japan Society of Civil Engineering in 2003, the Japan Sewage Works Association in 2008 and Japan Society for Analytical Chemistry in 2010.</p>	
<p>10<sup>th</sup> March 9:30-10:00</p>	<p><b>Lecture by Minister Dharmendra Pradhan</b> Hon'ble Minister Ministry of Petroleum &amp; Natural Gas, India</p>	

### 3-2. Special Sessions

Special Sessions were organized for various 3R-related topics. The topics of five sessions were Mega City & Material Cycles (by 3RINC's local organizer), Ministerial session (by 3RINC's local organizer), Resource Recovery from Industrial By-products and Waste for Climate Change (by Korea Institute of Geoscience and Mineral Resources and KSWM), Biomass Gasification (Co-organized by ISWMAW, KSWM and JSMCWM), and Status of 3R in Asia and Pacific Region (by UNCRD & IGES).

Prof. Jinwon Park (President of NIER (National Institute of Environmental Research) and KSWM), Dr. Karl Vrancken (VITO, Belgium) and Prof. Shailesh Dave (Gujarat University, India) gave keynote speeches at special sessions.

### 3-3. General Sessions

In the general sessions, there were 13 oral presentation sessions and 2 poster presentation sessions. We were very pleased to host a total of 160 presentations, including 100 oral (including special sessions) and 60 poster presentations.

Oral sessions consisted of the following topics in parallel in two to three rooms: 3R case study, SRF use and Waste to Energy, Metal resource recovery, Disaster waste and Hazardous waste, Industrial waste and Recycling technology, Thermal decomposition and treatment, Biomass utilization, e-Waste (two sessions), Adsorbent development, Landfill and soil pollution, 3R Policy, MFA and LCA, Food waste. Thanks to the Chairs' contributions and active participation from the floor, all of the sessions successfully promoted a deeper understanding and fruitful discussions on each topic.

Posters were shown during two sessions on March 8 and 9.



### 3-4. Awards

To encourage excellence at this and future conferences, the International Advisory Board presented Excellent Research Awards for oral presentations. Extended abstracts were submitted in advance for general oral sessions (and some presentations at special sessions that had originally been planned for the general sessions) were evaluated by international scientific researchers and other contributors. After the screening and voting, Excellent Research Awards were given to four presenters:

- Krishna Lal Chhetri: Balancing the Energy Demand by a Resource Circulation Project in Daejeon, Metropolitan City, Korea (Chungnam National University, Korea)
- Hyunhee Kim: Mercury Inventory and Flow Analysis of Waste Products and Materials in Korea

(Chungnam National University, Korea)

- Malavika Gopinath: Co-benefits of Decentralized Municipal Solid Waste Management: A Case Study of Pune (Indian Institute of Technology Bombay, India)
- Rieko Kubota: Legislation and Policy Drivers for Energy Recovery from Waste of United Kingdom (National Institute for Environmental Studies, Japan)

The awards were presented at the closing ceremony. We congratulate these researchers for their excellent presentations.





Recipients of the Excellent Research Awards

### 3-5. Opening and Closing Ceremony

At the opening Ceremony, Dr Girish Sahni (Secretary DSIR and Director General, CSIR, India), Mr. Shigemoto Kajihara (Vice Minister for Global Environmental Affairs, Ministry of the Environment, Japan), Prof. Jinwon Park (President of KSWM), Dr Harsh Vardhan (Honourable Union Minister for Science & Technology and Earth Sciences, India) and Prof. S K Ghosh (President ISWMAW and Professor of Jadavpur University, India) made remarks.

At the Closing Ceremony, Prof. Agamuthu Pariatamby (Institute of Biological Sciences, Faculty of Science, University of Malaya) made welcome address. Awards were introduced by Dr. Tomonori Ishigaki & Dr. Misuzu Asari (JSMCWM). Then, Prof. Shin-ichi Sakai (JSMCWM) reported briefly about 4<sup>th</sup> 3RINCs and announced the invitation to the Journal and 5<sup>th</sup> 3RINCs. Closing summary was made by Dr. D K Tuli (Executive Director, DBT-IOC Centre for Advanced Bioenergy Research). Finally, vote of thanks was given by Dr. Thallada Bhaskar (IIP Dehradun).

## 4. Other Events

### 4-1. Exhibition by Companies

The Exhibition was in the garden on March 8 (13:00–18:30) and March 9 (9:00–18:30). Exhibitors presented their technology and activities.

#### 4-2. Welcome Reception, Garden tour, Cultural event and Banquet

All participants enjoyed a Welcome Reception (networking dinner) held from 19:30 on March 8 and a Banquet starting at 19:30 on March 9. Indian professional dance group performed a traditional and regional dance before the banquet.



#### 4-3. Technical Tours

Technical and cultural tours were conducted for the participants.







## 5. Closing Comments

Although we had some problems with procedures, we think it was good to be able to hold the conference in one of the fastest growing countries in the world with many local and international participants. The cooperation of many collaborators and supporters resulted in a successful meeting. In addition, the participation of local residents, young researchers and ministerial people added to the energy and heartfelt exchange of ideas. For the future, continued efforts and measures to increase the participation from various Asian nations and to strength the network will be necessary. Finally, we would like to express our appreciation to all of the participants and supporters.