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Messages regarding the forthcoming 3R International



Dr. Ryutaro Yatsu, Vice Minister of the Environment of Japan

The world is changing fast. Japanese manufacturers who emit industrial wastes and waste management or recycling companies who support them, both are undergoing dramatic change. The concept of 3Rs (Reduce, Reuse and Recycle) will be developed under the Japanese companies' and government's leadership in the world and integrated in various countries according to the local conditions. At the G8 Summit in 2004 Japan advocated the principle of the 3Rs. Since then, not only the industrialized world but also emerging economies in Asia have been involved in the international cooperation on the 3Rs. The 2008 G8 Hokkaido Toyako Summit endorsed the 3R Action Plan. Subsequently, at the East Asia Summit Environment Ministers Meeting Japan proposed the establishment of an annual Asia 3R Forum. The following year, 2010, the first Asia 3R Forum was formally held in Tokyo. After Tokyo, the conference was held in Malaysia, Singapore, and then Vietnam. In February 2014 the 5th Asia 3R Conference will be held in Indonesia.

The origin of this series of events can be found in the Earth Summit in Rio de Janeiro, Brazil in 1992, and the Earth Summit in Johannesburg, South Africa in 2002. The United Nations reviews every year the progress of environmental policies in its member countries. The UN requested that Japan host a

conference to review the progress of 3R policies around the world. In 2011 a UN conference on waste management issues was held in Japan. In future, the Asia 3R Forum is expected to provide a unique opportunity to meet all of the stakeholders once a year in Asia including central and local governments, business community, academia and NGOs. Japan is committed to supporting this initiative.

Waste management practices have a direct impact on climate change with the emission of GHGs, but at the same time, can contribute to mitigate it by generating electricity or emission reduction of methane gas. From now on I would like to promote international cooperation for waste management and recycling from a wide variety of views. We are very happy to work with international partners to foster the 3Rs making full use of our successful experiences, know-how and technologies in Japan. As is the case with climate change and other environmental issues, science-policy linkage is essential. Therefore it is highly expected that the first 3R International Scientific Conference on Material Cycles and Waste Management will deliver outcomes supporting dialogue, formulation and implementation of 3R policies. I sincerely hope the conference to be an international arena, much like the "summary for policy makers" of the IPCC or the "millennium assessment" on biodiversity in producing an assessment report on the 3Rs.



Prof. Shin-ichi Sakai, Chairman of International Relations Committee of JSMCWM

In 2005 the Expert Meeting on Solid Waste Management in Asia and Pacific Islands (SWAPI) was held with the support of Ministry of the Environment of Japan. Waste management experts in Asia and Pacific countries were invited to Japan to exchange information on science and technologies related to waste management. So far the conference has been held twelve times. Based on SWAPI, and with an aim of a more open debate, 3R

International Scientific Conference (3RINCS) is planned to be held. After a government formulates a new approach to an issue; academics then deepen their studies on related technologies and social systems demanded by each country. The collaboration between the governmental approach and the academic studies is necessary as a link between science and policy.

Historically, European countries have led the waste processing and recycling policies. Waste to energy technology or recycling based on the concept of Extended Producer Responsibility (EPR) became a global standard originating from European social systems, programs, or technologies. Japan rapidly caught up to this trend and caught the world's attention in the early years of the 21st century.

Japan Waste Management Society (currently called the Japan Society of Material Cycles and Waste Management: JSMCWM) will cooperate with the Asia 3R Forum for the integration of all stakeholders in the development of a 3R-based society. Back in 1999 JSMCWM published the first issue of its academic international journal, the Journal of Material Cycles and Waste Management (JMCWM). Fifteen volumes have now been published. I believe that this journal has become a platform for academic and technological exchanges. The journal has also become a forum for the exchange of information for those in the public and private sectors and academia. It is the official journal of both the Japanese and South Korean waste management societies (JSMCWM and KSWM). Certain outcomes are found in information collection and exchanging opinions among experts. Moreover, 3RINCS 2014 will be a good opportunity for face-to-face exchanges.

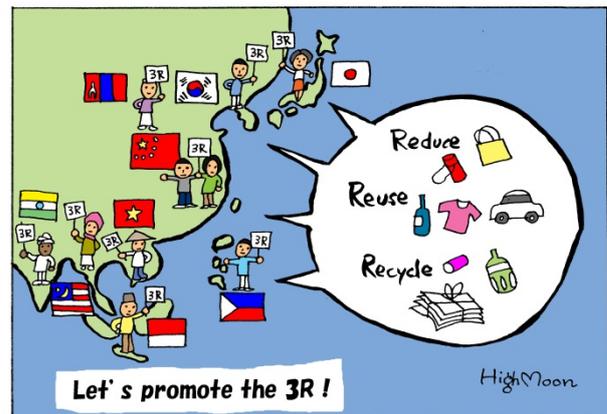


Dr. Morihiro Osada, Vice President of JSMCWM

Scientific approaches are essential in order to solve waste problems and for the development of the 3Rs. We have to seek ways of spreading knowledge and information developed among governments, academics and experts in the future. I strongly believe that this will help solve issues such as "there is a legal framework but no action". Further exchange between academics and experts as well as private companies, local governments, NGOs and citizens are needed.

To achieve this JSMCWM decided to hold a 3R international conference this March (10-12 March 2014) at Kyoto University, in cooperation with KSWM and the Chinese Society for Environmental Sciences (SSW-CSES), and with the support of the Ministry of the Environment of Japan, UNEP-IETEC, JICA Kansai, IGES, Kyoto Prefecture, and Kyoto City.

Full interview texts in Japanese are found in the January 1st, 2014 issue of *Weekly Recycling Economy Times* and the January issue of *Monthly The Waste*.



Report on 30th Anniversary of KSWM

On November 14th and 15th in 2013, the 30th Anniversary of the Korean Society of Waste Management (KSWM) was held at the International Convention Center (ICC) in Jeju, Korea. Prof. Akiko Kida, President of JSMCWM, Dr. Morihiro Osada, Vice President, Prof. Shin-ichi Sakai, Dr. Tomonori Ishigaki, Dr. Masato Yamada and Dr. Atsushi Terazono attended on behalf of JSMCWM together with other Japanese researchers.

At the opening session on the morning of the 14th, Prof. Kida gave a congratulatory address, together with speeches by Dr. Park Kwang-Suk, Director General of Resource Recirculation Bureau, Ministry of Environment, Korea and other respected contributors to the foundation of KSWM.

Two international sessions were organized about "Waste to Energy and Safe Disposal of Wastes" on the afternoon of the 14th including Dr. Ishigaki's presentation, and "Beyond Resources Recirculation" on the morning of the 15th including presentations by Prof. Sakai, Dr. Osada and Dr.

Terazono from Japan. We could recognize many significant activities and in-depth insights by the excellent KSWM members in the field of waste management, including an impressive review of waste-to-energy related facilities in Japan and Germany presented by Dr. Oh Gil-Jong of the South Korean National Institute of Environmental Research. Although most of the talks were in Korean, we could find very active presentations and communications among the participants at the poster session as well.

At the council meeting of the society, also held on the 14th, Prof. Jae-Hyuk Hyun of Chungnam National Univ. was selected as the next president of KSWM with warm celebrations.

The reception party had a great atmosphere with a variety of entertainment including a traditional lottery and local dances of Jeju Island. Prof. Kida presented KSWM with celebratory Japanese sake (rice wine) on behalf of JSMCWM.

The photographs posted around the venue gave a sense of KSWM's long history and the depth of contributors it draws upon. We also enjoyed seeing many familiar faces of contributors to our journal and of communications between our two societies amongst the pictures.

Jeju Island is only a two-hour direct flight from Narita or Nagoya airports. Its climate is very mild and similar to that of Kyushu or Shikoku in Japan. Perhaps also due to the fact it is a famous sightseeing destination, it seemed many of the Korean participants were accompanied by their wives/husbands to this academic and celebratory event. We felt Korean tradition and culture from the invited previous presidents as well as their wives, and from the many pleasant and harmonious chats we had. In order to promote a sound material cycle society in the East Asia region, we would like to continue our significant communication between Korean and Japanese societies to deepen our mutual understanding and cooperation, and to share useful knowledge and experiences in our two countries.



Opening session



Celebratory present from JSMCWM at the reception



Congratulatory address by Prof. Kida



Prof. Jae-Hyuk Hyun, new President of KSWM

(Atsushi Terazono)

Report of the international Session of the 24th conference of JSMCWM

The 24th conference of JSMCWM, consisting of a Japan-South Korea international symposium and an International Hybrid Session, was held on November 2, 2013 at Hokkaido University in Sapporo City. Sapporo is a city in central Hokkaido, Japan's northernmost major island, and has beautiful rows of houses in a grid pattern.

There were the 76 participants from South Korea, the highest yet for an international session. Moreover, the following day, November 3, there was a technical tour visiting a PCB treatment facility in Muroran City.

1. International Symposium

The theme of the lectures was "PCB and Persistent Organic Pollutants (POPs) Management". This theme had been decided upon after discussions between the Japanese and South Korean societies. Near the conference room, in Muroran City, Hokkaido, there is a PCB waste treatment facility. The subject of PCB waste and POPs waste has been gaining increasing attention globally and there is an issue in Asia to treat POPs waste in an appropriate manner. Moreover, it is important to discuss about the actual situation of PCB and POPs management from technical and political viewpoints of Japan and South Korea, as well as worldwide trends of new POPs.

There were four speeches, two each from the Japanese and Korean societies. The respective chairpersons were Professor Shinichi Sakai, Kyoto Univ. and Professor Yong-Chil Seo, Yonsei Univ.

Lecture 1 was "Current Status of PCB Treatment in Japan" by Professor Yukio Noma, Fukuoka Women's Univ. The lecture was about the history of policies for PCBs, treatment system and future direction. History of PCBs in Japan started with the first production of PCBs in 1954, the "Yusho incident" in 1968 by Kanegafuchi Chemical Co., PCBs in the waste management law and a special law for PCBs in 2001, additional regulation for treatment of low-contaminated PCB waste in 2012, and the treatment period of PCB waste is until 2027 by the amendment of a special law. As for treatment technology, the dechlorination-decomposition method for high-concentration PCB waste, plasma melting decomposition method for PCB contaminated waste such as fluorescent ballasts, concrete and other solid waste were explained. For future direction, promotion of incinerating low-contaminated PCB waste and the

plan to achieve the PCB waste treatment were presented.

Lecture 2 was "Current status of POP & PCB Management in Korea" by Dr. Sun Kyoung Shin of National Institute of Environmental Research. Roles of the Ministry of Environment of South Korea and related institutions, main policy of POPs, laws on POP management, history of PCB treatment, actual situation and future action plans were presented. The POP management law includes setting environmental standards, operation of monitoring points, restricting and banning of POP usage, discharge facilities management, setting the waste disposal standard and management of recycling products. As for the history of PCB policy in South Korea, PCBs were banned to be used as insulating oil for electric circuits in 1979. Later, PCB leaching standards were established by the waste management law in 1987, and there were several amendments after that. In the plan of PCB treatment in Korea, STEP-1 (~2015) is targeting the treatment of transformers located above ground which exceed 50ppm of PCBs and transformers installed on poles before 1998, STEP-2 (2015~2025) is targeting transformers located above ground which exceed 2ppm of PCBs and transformers installed on poles between 1999 and 2008.

Lecture 3 was "Current status of POP Treatment using High Temperature Incineration Technology in Korea" by Professor Bongjin Jung, University of Suwon. The evaluation results of demonstration tests on high temperature incineration technology in 2009 were reported. The demonstration tests were conducted to check if the treatment was environmentally appropriate when high temperature incineration technology is used to treat PCB waste. The tests were conducted at six pilot plants. Four treatment methodologies were used, Blast Furnace Method, Molten Salt Method, Plasma Method, and (Rotary kiln + Stoker) Method. The results showed that all of the pilot plants cleared the evaluation criteria on PCB emissions and others. More research is needed for these methods to be used commercially, especially the Blast Furnace Method and Molten Salt Method. There was a comment that research on NOx reduction was needed for the Plasma method. As of December 2012, there are 14 PCB waste treatment facilities in operating in South Korea; four of them have been using high temperature incineration technology.

Lecture 4 was "Brominated Flame Retardants (BFRs)

as Novel POPs and Their Management” by Dr. Hidetaka Takigami (NIES). His lecture covered characterization of BFRs, research in Japan, reporting of research results and future directions.

Regarding emissions of BFRs into the environment and management of BFRs over their entire lifecycle, there was research about BFR concentrations in products, behaviors of BFRs when used and when products containing BFRs are disposed, landfilled and recycled. One of the research results was that there were more emissions into the air during the process of production, on the other hand, there was significant biological exposure in homes during long-term use and when surrounded by televisions and other electrical appliances and incombustible materials like curtains. The results of sunlight exposure tests for incombustible curtains and transition of concentration of BFRs from a landfill lysimeter were reported. For future direction, BFRs risk management of product lifecycles is needed. Due to the health risks posed by BFRs, control of long term biological exposure to dust at home and offices and in work environments, both in manufacturing and recycling processes is important. Substitution of safer chemical materials and review of product designing is also required.

2. International Hybrid Session : Short Oral Presentations

The short oral presentations for the poster session were chaired by Dr. Atsushi Terazono (NIES). Each presenter was given 90 seconds to explain the poster using only one slide. There were 47 presentations, 40 were from KSWM and 6 from the Japanese side (including foreign students), and one from Taiwan. By category, eight were about 3R/waste management, 13 were about recycling, 11 were about thermal treatment, 11 were about treatment technology and landfill and four were about hazardous waste.

Some presenters were not able to explain in 90 seconds, however, the overall observation was good. The presentations enabled the participants of the conference to find their interesting posters in advance.

After the short oral presentations, the poster presentations were held in four rooms. There were many participants from the general session, citizen groups and private companies. There was also the vote for the best posters, with four posters of the international session winning awards.

3. Technical tour for KSWM

The technical tour for the international symposium participants was conducted on November 3, visiting the PCB treatment facility of Japan Environmental Safety Corporation (JESCO) Hokkaido office. In total 60 members participated, of them, 48 were from the Korean side including the chairman of KSWM. A courtesy call to Mr. Terashima, Deputy Mayor of Muroran City was made by Prof. Yong-Chil Seothe, chairman of KSWM, Prof. Sakai, chairman of the international committee and other directors of JSMCWM. Participants enjoyed the beautiful autumn and great nature of Hokkaido by visiting Lake Toya and Showa-shinzan. Lastly, we would like to express our appreciation of the kind cooperation of JESCO for enabling our visit.

The 24th Annual Conference of JSMCWM
Excellent Presentation at International Hybrid Session

Poster No.	Title & Presenter
FA-6	Fundamental Survey for the Application of Waste to Energy Technology in Phnom Penh Capital City of Cambodia Munsol Ju (Seoul National University)
FC-4	Thermal Degradation Characteristics of Mercury from Industrial Sludge Back Seung Ki (Yonsei University)
FC-1	Fluidized bed hydrolysis of poly (bisphenol A) carbonate Grause Guido (Tohoku University)
FE-3	Development of low cost and environmentally benign removal technology for cesium and strontium from water by using biomass wastes Pangeni Bimala (Saga University)

Congratulations!



The participants of technical tour to Showa-shinzan
(Takashi Miyagawa and Mamoru Inoue)

Biomass flow in an organic farm

Biomass is well known as an alternative energy source or a renewable energy source for sustainable development. However, people have overlooked the benefits of biomass recycling within a farm system. Oil palm, rice, sugar cane, rubber and maize (corn) are crops that generate considerable amounts of residues

in Malaysia. These residues constitute a major proportion of the total annual production of biomass residues and are an important source of biomass both for domestic, as well as, industrial purposes [1]. Unlike bioenergy, biomass utilization within a farm system is a cheaper option of sustainability. This avoids transportation costs, because the biomass is recycled within the farm system. In addition, less biomass will be imported by the farm, which will reduce the production costs. Most important it minimizes biomass outflow and improves the soil biomass stock. Biomass increases the organic matter of soil and is believed to increase the organic carbon content of soil with the objective of carbon sequestration [2].

Organic farming is a form of agriculture that relies on large inputs of biomass and biological pest control to avoid any use of synthetic chemicals. This study aims to evaluate and understand the biomass flow of an existing organic vegetable farm. The study employs material flow analysis with STAN software to consolidate and analyse data collected through quantitative and qualitative methods.

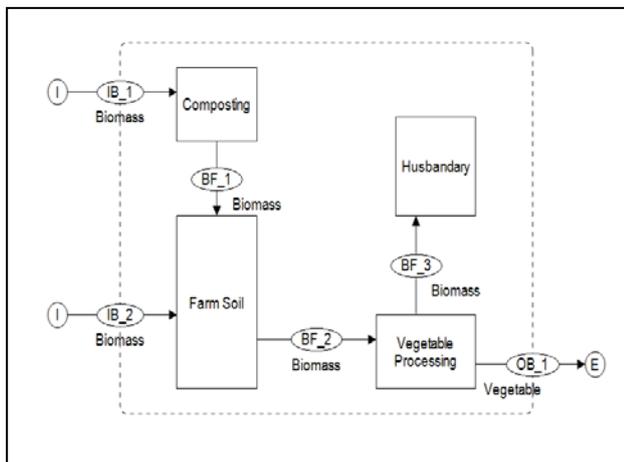


Figure 1: Biomass flow in an organic farm (IB=Input Biomass, BF=Biomass Flow, OB=Output Biomass)

Figure 1 demonstrates the biomass flow in the organic vegetable farm. There are two types of biomass input into the organic farm system, direct biomass input without any prior processing at the farm (e.g., animal manure, peat moss and seeds) and the second type is composted material (including Bokashi compost, vermicompost, and normal compost), where biomass has gone through composting stage to break down the organic matter and any pathogens within the compost material have been sterilized by the heat generated by the composting material. Compost is a major

component in the organic farm system, where about 2,750 tonnes $\text{ha}^{-1}\text{yr}^{-1}$ of compost was applied to the soil.

Harvested vegetables are the only biomass output from the farm system, which accounts for a total of 109 tonnes $\text{ha}^{-1}\text{yr}^{-1}$. 10% of the plant matter (crop residues) was left on the farm soil as a soil amendment. No biomass output was noticed from the husbandry section, as excreta remained in the compound of the husbandry section without further usage. The harvested vegetables undergo postharvest treatment such as washing, drying, trimming, peeling, cutting and shredding before being transported off the farm to be sold. During this stage, biomass waste was generated at about 0.01 tonne $\text{ha}^{-1}\text{yr}^{-1}$. The biomass waste was given to the animals in the husbandry section as feed.

There are two recycling pathways identified: organic waste from postharvest processes and manure from the husbandry section. The study farm currently recycles the organic waste from postharvest processes as animal feed; however, the manure generated in the husbandry section is not currently recycled. Figure 2 shows the possible biomass recycling routes available within the farm system. Three sources of biomass can be recycled: crop residues, organic waste from vegetable processing and manure from husbandry.

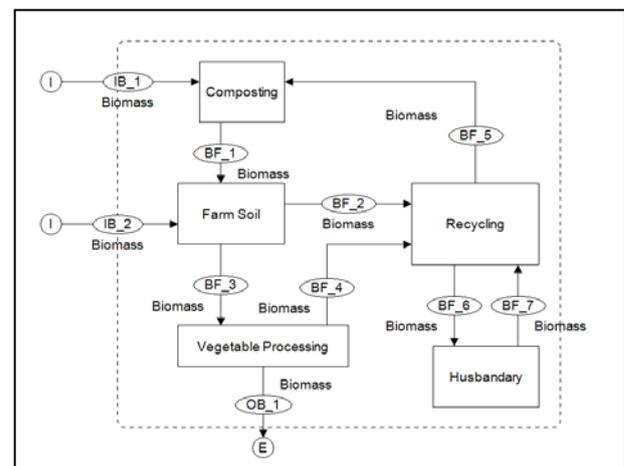


Figure 2: Optimized Biomass Recycling flow (IB=Input Biomass, BF=Biomass Flow, OB=Output Biomass)

High biomass input and biomass recycling at the study organic farm demonstrated the prospect of restoring organic matter levels in soil. The soil carbon concentration of the top 10 cm of soil increased 1.2 % during the study period of 24 months. Only the top 10 cm layer of topsoil is evaluated as it is the ploughing zone. The increment is slightly lower than that

recorded by Leifeld and Fuhrer, where 2.2 % increase of soil carbon concentration was observed [3]. This difference may be due to the carbon concentration of biomass input, soil characteristics, precipitation, and temperature. Generally, biomass input increased soil organic content which leads to an improved soil carbon concentration.

Three biomass recycling routes are available at the organic farm, of which only one route was being utilized. Thus, despite the current recycling practices at the farm, there is a still opportunity to optimize the biomass recycling within the farm system. The increase of soil carbon concentration indicates high biomass input at the organic farm has contributed to carbon sequestration. The biomass recycling system has the potential to increase soil carbon stocks and reduce carbon outflow. Optimizing biomass recycling will displace significant quantities of farm biomass import, which in turn will reduce the production costs and the carbon footprint of the farm.

References:

[1] Koopmans, A., & Koppejan, J. (1997). Agricultural and forest residues - generation, utilization and availability. Paper presented at the Regional Consultation on Modern Applications of Biomass Energy, 6, 10.

[2] Guo, L. B., & Gifford, R. M. (2002). Soil carbon stocks and land use change: a meta analysis. *Global change biology*, 8(4), 345-360.

[3] Leifeld, J., & Fuhrer, J. (2010). Organic farming and soil carbon sequestration: what do we really know about the benefits? *Ambio*, 39(8), 585-599.

(Agamuthu, P. and HongYeng, L.)

Upcoming events

3R International, SWAPI
10-12, March 2014 at Kyoto
<http://3ri-2014.org/>

The 25th Annual Conference of Japan Society of Material Cycles and Waste Management (JSMCWM)
15-17, September 2014 at Hiroshima
<http://jsmcwm.or.jp/?p=2950>

ISWA at IFAT
5-9, May 2014 at Munich, Germany
http://www.iswa.org/nc/events/iswa-calendar/eventdetail/show_detail/ifat-resourcesinnovationsolutions/

Material Cycles and Waste Management Research Vol.24, No.6 (November, 2013)

Preface

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Shinichiro Ohgaki

Special issues: Now is the Time to Reconsider “Disaster Debris Treatment Plan” in Japan that has a Lot of Earthquakes

on the Basis of the Great East Japan Earthquake Approach of the Waste Management Plan Department and Intention on Feature Article
Keiko Nakamura

Disaster Waste Management Guidelines and Studies on Waste Management for Large-scale Earthquakes
Sadaaki Wakabayashi, Sadayuki Miyata and Takuya Kirikawa

Disposal of Disaster Waste Generated by the Great East Japan Earthquake Disaster
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Revision of Implementation Guidelines for the Disaster-generated Waste Treatment by Sendai City
Moriya Endo

Disaster Waste Disposal Strategizing for Small Municipalities: One town's Experiences of the Great East Japan Earthquake
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Planning Strategies for Disaster Debris Management from a SMW Consultant's Viewpoint
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Important Points in Disaster Debris Management Planning Based on Challenges of Debris Processing
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Broad Backing Provided in Development of Strategies for Handling Disaster Waste
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Current Status of Debris from the Great East Japan Earthquake and Conceptual Ideas for Recycling
Makoto Hisada, Hiroshi Minagawa and Shintaro Miyamoto

Introductory Course, Introduction of Physics and Chemistry for Material Cycles and Waste Management 3: ***Chemical Equilibria in High Temperature Condition:***

Calculation of Saturated Vapour Pressure and Equilibrium Diagram Based on Chemical Potential
Nobuhisa Watanabe

Report on 25th Annual Symposium hosted by JSMCWM, Symposium of Japan Society of Material Cycles and Waste Management in Muroran 2013:

From a Safe and Secure Waste Treatment System to an Emerging Green Industry

*Report of the JSMCWM Research Division
Toward Sustainable Future Growth for the Recycling of Small Household Appliances
Activity Report from the Regional Chapter
Activity Report of the Chugoku-Shikoku Regional Chapter*

**Journal of the Japan Society of
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Paper

Behavior of Perfluorinated Compounds Adsorbed in Exhausted Activated Carbon during Thermal Treatment and Combustion

Mitsuyasu Takata, Shusaku Yamamoto, Ryouta Nishioka, Shusuke Takemine, Shuhei Tanaka, Shigeo Fujii and Nobuhisa Watanabe

Collection and Recycling Schemes for Waste Batteries in Europe and Implications for Japan:Denmark and Switzerland

Tomohiro Tasaki and Misuzu Asari

Oxidative Decomposition and Mineralization of Refractory Pharmaceutical Products using Persulfate

Ryo Uchida, Mitsuhiro Kubota, Hitoki Matsuda and Nobuyuki Uemura

Compressive Strength and Acid Resistance Characteristics of Cement Pastes that Include Waste Ceramic Insulation and Blast-furnace Slag

Haruki Shimazu, Hiroshi Higashiyama, Mitsunobu Iwasaki, Hajime Kaku, Kazuki Baba and Shuhei Fuku

Current Members of JSMCWM as of December 31, 2013	
Regular Members	2,336
Fellow	37
Senior	22
Honorary member	4
Students	233
Public Institutions	87
Supporting companies	118
NPOs	5
Individual	14
Total	2,856

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