Japan Society of Electromagnetic Wave Energy Applications (JEMEA)

The 15th JEMEA Lecture Meeting

-Microwave Challenging Utilization for Novel development in Steelmaking and Resource Utilization in EU and Japan -

https://www.jemea.org/?p=58759&lang=en

Cooperative Organization　(Sponsorship decided) Catalysis Society of Japan / The Chemical Society of Japan / IEEE MTT-S Japan/Kansai Nagoya Chapter/ The Iron and Steel Institute of Japan/ Japan Electro-heat Center/ The Mining and Materials Processing Institute/ The Society of Chemical Engineers, Japan / The Society of Polymer Science, Japan

1. Date & Time　May 24/2024　13：55～18：10

2. Preface With the global green transformation underway, the electrification of various industrial processes is emerging as a worldwide trend, extending beyond Japan. This lecture will focus on the processing of raw materials and by-products in mining processes, which traditionally rely on fossil fuels as their primary energy source, as well as technologies for utilizing biomass as a carbon-neutral material, aiming for societal implementation. We will invite European researchers as lecturers to share insights on microwave heating application technology. The lecture will be conducted entirely online. Given the rare opportunity to hear from these lecturers, we encourage your participation. Whether you are a member or not, we eagerly await your active involvement.

3. Program（5/10/2024）　(Honorifics Omitted)　【Language】English

13:00～13:45　"JEMEA Regular General Meeting"(Only JEMEA member can connect)

【Chair 1: Associate Prof. Shutaro Tsubaki (kyushu University) 】

13:55-14:00 Opening

14:00～15:00　" Can Microwave Heating Technology Contribute to Coal Alternatives and Powdered Raw Material Utilization for Next-Generation Ironmaking? "
Lecturer1：Prof. Ko-ichiro Ohno (Kyushu University)

Abstract: The challenges of transitioning from coal usage and developing technologies for the direct utilization of powdered raw materials are central to the Green Transformation of ironmaking. This presentation will introduce ongoing research on coal alternatives and direct utilization of powdered ores, while also discussing the advantages and challenges of microwave heating.

【Chair 2: Prof. Ko-ichiro Ohno (kyushu University) 】

15:00～16:00　" Microwaves as a potential energy source for the co-recycling of electric arc furnace dust with halogenated plastics "
Lecturer2：Dr. Sanad Altarawneh (University of Nottingham)

Abstract：The accumulation of metallurgical wastes such as Electric arc furnace dust (EAFD) is considered a direct threat to the environment. Current research is split into hydrometallurgical and pyrometallurgical routes to mitigate the environmental footprint of EAFD. Both approaches pivot around extracting valuable metals namely zinc and lead leaving behind iron rich residue. The latter has been realised at an industrial scale, however, with large quantities of harmful emissions to the environment along with extensive energy usage. Can the utilisation of microwave energy provide the solution to these challenges leading to less overall energy consumption and a reduced harmful emissions?

16:00～16:10　Break

【Chair 3: Associate Prof. Shutaro Tsubaki (kyushu University) 】

16:10～17:10　"Biomass-associated reactions with SAIREM microwave equipment: pyrolysis and extraction. Identification of MW effect"
Lecturer3 : Dr. Alisa Doroshenko (SAIREM)

Abstract：Sustainable thermochemical technology for biomass valorisation should be controllableand selective to maximize the value of biomass resources. Microwave heating is an alternative to the traditional conventional processes. However, it possesses improved control and higher selectivity due to a dipolar polarisation heating mechanism.
Here we report a unique microwave system (MicroChem) with a possibility for an optimisation of the applied electric field, which substantially increases the number of samples suitable for homogeneous microwave heating. The integrated solid-state microwave generator has superior advantages over the magnetron-based technology such as operating from 1 W to the maximal power with 1 W step accuracy and choice of the suitable frequency from 2400 MHz to 2500 MHz. The power balance is provided by SAIREM equipment due to real-time monitoring and control of the forwarded, reflected and transmitted power. A combination of precise power control and power balance opens an opportunity to determine thermodynamic and the kinetic constants of the process, monitoring the phase-transition reactions in real-time.

【Chair 4: Prof. Ko-ichiro Ohno (kyushu University) 】

17:10～18:10　"Microwaves energy as new technology for processing steelmaking sidestreams – Advantages and challenges"
Lecturer4：Dr. Mamdouh Omran (The University of Oulu)

Abstract :　Steel industries generate large streams of by-products wastes annually. These wastes are considered to be hazardous material in many European countries due to their high contents of leachable heavy metals. The environmental regulations force the metal industry to take major steps towards efficient recycling of by-products wastes and prohibiting the wastes landfilling. The current recycling techniques still facing economic, environmental and technical problems due to high energy requirements and high pollution. Recently, microwave energy has been proposed as a new promising method to efficiency recycling steelmaking by products and overcome the

disadvantages of traditional recycling methods. In this lecture, a summary of the work related to microwave processing steelmaking sidestreams, and the main challenges need to be resolved in microwave technology to move forward and upscaling this technique from the small laboratory scale to the full production scale.

4. Venue　Online （Zoom）
(After registration, you'll receive information about connection, Password for proceedings)
Deadline of registration: May 23(Thu)

5.【Attendance fee（With Proceeding download password）】－Tax included, Issue receipt

JEMEA & Cooperative organization member（Early registration（Deadline: 4/30(Tue))	5,000(JPY)
JEMEA & Cooperative organization member （Latter registration (5/1- Deadline:5/23)	7,000(JPY)
Nonmember（Regular）	10,000(JPY)
Student	2,500(JPY)

JEMEA will not hold online mixer.

※For paying registration fee, you need bank transfer. (Deadline: Early registration(4/30(Tue), Latter registration(5/31(Fri)). After registration, auto-response e-mail including Bank account number for registration fee will be arrived. (MUFJ Bank). After bank transfer, you will get Zoom connection information and receipt. If you need invoice, please inform JEMEA by using registration site. If you can't attend JEMEA lecture meeting after payment, you can't cancel registration, but you can download proceedings.

※If you are JEMEA member, you can pay JEMEA annual fee with attendance fee.
JEMEA annual fee (2024)
Regular 7,000(JPY)、Student member 3,000(JPY)、Corporate member 40,000(JPY) per nit

※For non-member, if you want to be JEMEA member, please see below.
【Solicitation for JEMEA Member】https://www.jemea.org/?page_id=134
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【Registration for Lecture Meeting】
(Capacity: 100 (Online) On a first-come-first-served basis)
Deadline of registration(Bank transfer): Early registration(4/30(Tue))、
Latter registration :From 5/1-5/23(Thu)—Final deadline)

【Registration for Lecture Meeting】https://www.jemea.org/?page_id=59010

【Host】Japan Society of Electromagnetic Wave Energy Applications (JEMEA)

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