

HU-ACE NEWS LETTER

Advanced Core for Energetics, Hiroshima University

Vol. 23
2018.11

Activities of the Core

- | | |
|---------------|---|
| Nov. 14, 2018 | The 69 th Hiroshima University Biomass Evening Seminar (co-organization) |
| Nov. 15, 2018 | Prof. Matsumura delivered the plenary lecture at the 2nd Sriwijaya International Conference on Science, Engineering and Technology (SICEST2018) |
| Nov. 21, 2018 | Hiroshima University Hydrogen and Future generation Energy Seminar 2018 Vol.1 |
| Nov. 21, 2018 | The 26th HU-ACE Steering Committee Meeting |

Hiroshima University Hydrogen and Future generation Energy Seminar

As the 43rd HU-ACE seminar, Hydrogen and Future generation Energy Seminar 2018 Vol.1 "Issues for Realization of Hydrogen Society! And its feasibility?" was co-hosted in Hiroshima City on Nov. 21. From HU-ACE, Prof. T. Ichikawa, Leader of the Hydrogen Group, gave a lecture entitled "Aiming to realize a CO₂-free hydrogen society". As the other lectures, researchers from Asahi Kasei Corp., Toshiba Energy Systems & Solutions Corp., and The Chugoku Electric Power Co., Inc. introduced some latest trends. There were more than 100 participants from inside and outside the Hiroshima area at the seminar, and active questions and answers were exchanged.



Issued by Advanced Core for Energetics, Hiroshima University

HU-ACE Secretariat, Research Planning Office, Hiroshima University,
1-3-2 Kagamiyama, Higashi-Hiroshima, 739-8511 Japan
<http://home.hiroshima-u.ac.jp/hu-ace/en/>

Research Topics

Feasibility study on Anaerobic Digestion System for Woody Biomass

Junichi Kato

Professor, Graduate School of Advanced Sciences of Matter,
Department of Molecular Biotechnology, Hiroshima University

Research field: Engineering/Environmental Biotechnology

Keyword: Anaerobic digestion/Radioactively Contaminated Woody Biomass



Abstract

Background Fukushima Daiichi nuclear disaster (2011) has resulted in radioactive contamination in vast area of forest, grassland and cropland in Japan. The government has decided to transfer contaminated plant biomass to the intermediate storage area and preserve them for more than 20 years to cool down radioactivity. Volume of contaminated plant biomass should be reduced before transferring to the storage area because it has limited area. In the previous research project, we developed the treatment system for volume reduction, which includes wet-milling pretreatment and anaerobic digestion, and demonstrated that it can effectively reduce rice straw and produced radioactive-free methane gas. In this project, we have evaluated its feasibility for treatment of woody biomass using a pilot scale treatment system (Fig. 1).

Methods It is well known that woody biomass without pretreatment is refractory to anaerobic digestion. Therefore, a pretreatment is the key for successful anaerobic digestion of woody biomass. We have utilized the wet milling method for pretreatment of wood powder. It is ball milling in the presence of degradation enzymes, which enables simultaneous physical and biochemical degradation of woody biomass. We have set up the pilot-scale treatment system in Minami-Soma city located at 20 km north of Fukushima Daiichi. We have treated radioactively contaminated woods sampled in this city and investigated methane production.



Fig. 1 The pilot-scale treatment system built in Minami-Soma city. The wet milling (left end), the bioreactor for anaerobic digestion (central), and the bioreactor for decontamination of digested fluid.

Results Laboratory test confirmed that methane was hardly produced when wood powder without pretreatment was subjected to anaerobic digestion. The pilot plant test revealed the wet milling treatment enabled stable methane production from cedar heartwood. We also demonstrated mixed sample of cedar, red pine, and quercus as well as bark can be used for methane production in anaerobic digestion. The radioactivity of produced biogas was below the detection limit, revealing that it can be used as clean and safe energy source (see right photo).



Reference Kato, J, et al. Development of biotreatment system for radioactively contaminated plant biomass. Isotope News, No. 745 (2016) (Japanese).

This is a joint project together with FFPRI, Shizuoka Univ., and Hiroshima International University.