Advanced Core for Energetics, Hiroshima University Vol. 26

HU-ACE NEWS LETTER

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Activities of the Core

Feb. 1, 2019	HU-ACE General Meeting and New Year Party
Feb. 7, 2019	The 72nd Hiroshima University Biomass Evening Seminar (co-organization)
Feb. 19, 2019	Hydrogen Symposium (co-organization)
Feb. 26, 2019	Prof. Matsumura received the Institute Award (Academic Division) of Japan Institute of Energy

Prof. Matsumura received the Institute Award of Japan Institute of Energy

On February 26, 2019, Prof. Matsumura, deputy representative of HU-ACE, received the Institute Award (Academic Division) at the award ceremony of the Japan Institute of Energy held at Gakushikaikan (Graduate Faculty Club). The award-winning research content was “Reaction engineering study on hydrothermal treatment of biomass". Quantitative study on hydrothermal treatment of biomass using hot compressed water from the viewpoint of thermodynamics and reaction kinetics was evaluated. After receiving the award plate in the ceremony, Prof. Matsumura gave a lecture of the winners concentrating on supercritical water gasification technology.

Related information

The 3rd International Symposium on Fuels and Energy (ISFE2019) will be held on Jul. 8-10, 2019 in Higashi-Hiroshima City. The chair will be Prof. Keiya Nishida and the secretariats are Prof. Yutaka Nakashimada and Prof. Takahisa Tajima. Official announcement will be made later, but please secure your schedule.

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Research Topics

Development of salt tolerant methane fermentation technology to recover energy from seaweed

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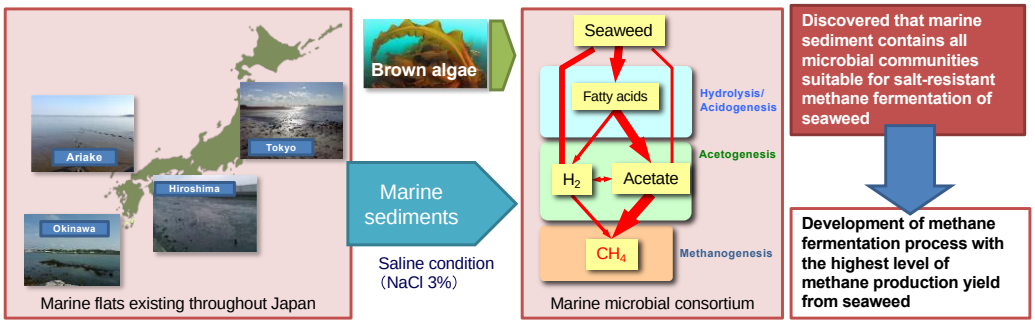
Research field: Bioengineering / Metabolic engineering / Environmental microbial technology
Keyword: Biomass / methane fermentation / syngas fermentation

Abstract



Background

Seaweed is expected as abundant biomass resource not competing with food demand. We developed biorefinery process of seaweed with the research funding from JST CREST (2012-2017). It consisted of 1) energy recovery by high efficiency methane fermentation, 2) production of high-value added substances, 3) treatment of fermentation residues with recovery of valuable metals and energy, and 4) integrated development of elemental technologies related to pretreatment suitable for fermentation raw materials. The project was conducted mainly by researchers related to biomass conversion technology of Hiroshima University.

Research contents

In order to minimize the input energy in methane fermentation of seaweed, it is necessary to ferment the raw algae without drying it. However, fresh algal bodies contain about 2-3% of salt. For this reason, it was difficult to methane ferment by salt inhibition in conventional freshwater methane fermentation. Therefore, we focused on marine sediment mud which is available in large quantities from not special environment, and developed a salt tolerant methane fermentation method under saltwater condition from pulverized brown algae.

Results

We discovered that microorganisms in several marine sediment mud in Japan can easily decompose brown algae and efficiently generate methane even under seawater salt concentration conditions. Thus, we developed a method for accumulating a group of microorganisms that methanize this brown algae, and long-term and stable methane fermentation process under undiluted high salt conditions. The obtained microorganism group has methane fermentation performance even in the presence of 5% salt, and opens the way for expanding energy-generating resources such as high salt wastewater and fishery waste which were traditionally difficult to methane ferment.

Reference

1) T. Miura, et al., Bioresour. Technol. 169, 362-366 (2014).
2) A. Kita, et al., Journal of the Japan Petroleum Institute. 59, 9-15 (2016).
3) T. Miura, et al., Bioresour. Technol. 245, 833-840 (2017).