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第141回 未来化学創造センターセミナー

応化分子教室セミナー

Innovative production of fuels and chemicals from renewable resources

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Date & Time : 26th Feb, 2013 16 : 00 ~ 17 : 00

Venue : Ito campus W3-209 (応化会議室)

A 2-step process for biodiesel production has been developed. Triglycerides are first hydrolyzed to fatty acids, which are then reacted with methanol using either immobilized lipases or solid acids as catalysts to produce biodiesel. This 2-step process allows the use of crude vegetable oils containing fatty acids or water and produces salt-free glycerol directly.

A method for converting "hard" substrates such as xylose, arabinose and glycerol to biogas has been developed. Exogenous microbes that are able to convert these "hard" substrates into biogas intermediates are introduced into the conventional anaerobic digestion system for easier digestion by the methane-producing microbes.

A method for genome shuffling to improve microbes has been developed. The whole genome of the parental strain is amplified by error-prone PCR to create DNA fragments with random mutations followed by transforming the DNA fragments into the parental strain to create a library of mutants by homologous recombination. This technique has been successfully utilized to improve the ethanol tolerance of a yeast strain and acid tolerance of a lactic acid bacterium.

A method for introducing random point mutations to small size DNAs has been developed. The small size DNAs are first ligated to form long chain DNAs consisting of the repeated units of the small size DNAs, which are then subjected to the conventional error-prone PCR to introduce random mutations followed by cutting them into DNA fragments of the original size. This method has been utilized for directed evolution of the signal peptide of a glucoamylase.

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