

## **Biotechnology for the Treatment and Recycling of Biomass** **---Collaboration among Asian Countries---**

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In these years, biomass began to attract much attentions as a sustainable resource for energy and organic materials. Japan is very poor country in terms of organic resources, and the most abundant un-used organic resource in Japan is believed to be organic wastes. In Japan, total amount of organic waste such as kitchen garbage, agricultural waste and sludge, reaches to 300 million tons per year. On the contrary, in Southern-Eastern Asian countries, biomass productivity in the field and forest is commonly high, and a plenty of unused organic materials are produced from agriculture, forestry, food industry, and so on, every year.

I believe that the utilization of microbial abilities to decompose biomass to produce energetic and/or useful organic materials is highly desirable, because of the following reasons.

- (1) Microbial/biological process is the most environmentally friendly technology, because the decomposition of organic wastes by microorganisms has been occurred on this planet since before the appearance of mankind.
- (2) Microbial/biological processes are energy saving systems, because they can be achieved in normal (temperature, pressure, etc.) conditions, and catalyses (enzymes) required for those processes are produced and degraded automatically on requests.
- (3) Microbial/biological processes are essentially suitable for local small systems, and fundamentally treatment of wastes should be done on site.

One important break-through technology to develop the new microbial/biological processes for the degradation and utilization of biomass and/or organic wastes is effective utilization of microbial communities. In natural environment, degradation of organic wastes can be achieved effectively by the coordination of various kinds of microorganisms. I believe that microbial communities instead of isolated pure

microorganisms should be used for the degradation and utilization of biomass from the viewpoints of efficiency and stability of decomposition. Systems using microbial communities have also much advantage from the consideration of the energy efficiency, because those systems do not require sterilization.

In this presentation, I will also summarize our recent projects on microbial degradation and utilization of biomass/organic wastes, namely two national projects conducted by the Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO), construction of a new inter-disciplinary laboratory in the University of Tokyo, and a collaborative program among South-Asian countries conducted by Japan Society for the Promotion of Science (JSPS) and the International Center for Biotechnology, Osaka University (ICBiotech).

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