

Miyakonojyou Basin Area

Creation of Environmentally-Friendly Industry through Advanced Utilization of Biomass

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Project Promotion

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Major Participating Research Organizations

Industry...Miyakonojyo Forest Association, Kiyomoto Co., Ltd.,
Kyushu Olympia Kogyo CO.,LTD., Kirishima Shuzo CO., LTD.,
JA Miyakonojyo, Tomoku Wood Works,
Miyakonojyo Precutting Industry Cooperative Society,
Sennin Corporation, Hidaka Katsusaburo Store,
Miyazaki Midori Pharms.,Inc., Nangoku Kousan Co., LTD.,
Hazama Farm Co., Ltd., Yamato Kouki Co., Ltd.,
Shimomori Kenso Co., Ltd., Sankyo Kankyosha Planner Co., Ltd.,
Hamada Seisakusho Co., Ltd.
Academia...University of Miyazaki, Miyakonojo National College of Technology
Government...Miyazaki Prefectural Wood Utilization Research Center,
Miyazaki Prefecture Industrial Technology Center,
Miyazaki Livestock Research Institute

Core Research Organizations

Miyazaki Prefectural Wood Utilization Research Center
University of Miyazaki, Miyakonojo National College of Technology

The main study results

- Livestock excrement processing that makes low quality charcoal firework fuel and development of cascade utilization system of the energy
 - Investigating the condition for mixing charcoal showed that the correct mix of charcoal and pig excrement could increase the rate of drying and ease of operation, and reduce stench.
 - The size was clarified by examining the pilot scale incinerator, and the combustion efficiency improved more than the mixture of the particulate charcoal when even 1mm or less pulverized coal was kneaded into the pig excrement. Thus it was shown that self-sustained combustion at 800 or more is possible.
 - The vapor quantity was measured with a vapour flow amount meter, and a necessary vapor added over time depending on the quantity of drying lumber was clarified.
- Recovery of useful material that derives from biomass use system and development of novel functionality material
 - The essential oil components were separated from the cryptomeria material drying effluent by solvent extraction and the adsorbent separation technique. The fungicidal activity, antiviral activity, ant resistant properties, and deterrent effects on destructive insects were clarified.
 - The phosphorus extraction and the phosphorus separation in the pig excrement were done as a basic study to recover phosphorus from the combustion incineration residue of the pig excrement fuel. Recovery of hydroxyapatite was shown.
 - Minute algae that were able to culture and to produce useful materials were searched and separated from the natural world by using the combustion gas and heat. High temperature resistance algae, algae with vitamin E high production capability, algae with ammonia absorption capability, algae with phenolic hydroxyl group, and algae with hazardous compound removal capacity are under investigation with patents pending.



Pilot scale furnace

Aim of research and development

The model of contribution to mountain village revitalization and global warming prevention is illustrated by the expanded use of prefecturally produced material and effective utilization of unused woody biomass in the Miyakonojo basin area with its accumulation of wood allied industries. Moreover, given Miyazaki's role as the eighth largest agricultural producer in Japan with a particular focus on livestock, the development of incineration treatment technology for pig excrement with difficult methane fermentation and composting properties is necessary to ensure development of healthy food supplies base and to eliminate excessive nitrogen in the soil as a result of accumulated stock raising.

Working from this foundation, our goal is to recover useful material from incineration residue, effluent, and carbon oxides. We are also developing pig excrement incineration treatment and the lumber drying system that thoroughly utilizes the unused potential energy in woody biomass. Through these processes we aim to derive raw materials and develop novel functionality materials. Accordingly, we have plans for forestry promotion and the creation of new technology and new industries. We are striving to implement the environmentally-friendly agriculture and stock raising practices with the goals of promoting industry and attaining a safe and comfortable closed-loop materials-cycle society.

Contents of research

1. Disposal of Livestock Excrement Using Low Quality Charcoal and Development of the Cascade Energy Recycle System

Unused wood resources are utilized with low-cost manufacturing technologies for carbon neutral quality charcoal to transform low quality charcoal for the incineration pig excrement that is resistant to self-sustained combustion. The fundamental physical properties of pig excrement and the low quality charcoal are measured, and the conditions for mixing materials with difficult blending properties are also investigated. The pilot scale incinerator is set up from the bench scale incinerator based on the result of acquired data and the numerical simulation, and combustion test is done. Cost comparison with an existing lumber drying system is conducted from the generated thermal energy data to confirm the economic advantage.

2. Retrieval of useful material that derives from biomass use system and development of novel functionality material

Analyzing the chemical structure and the composition of the compounds produced in lumber drying and the above-mentioned energy cascade specifies which compounds can be utilized for bioactive compounds and paints, and establishes technology for using these compounds.

Moreover, autotrophs such as marine microalgae are separated from the natural world to establish technology for the recovery of phosphorus from the incineration residue exhausted by the system. The process for fixing carbon dioxide generation from the incinerator and the condition for separation and cultivation are investigated for this purpose.

Expected results of research and application to industries

Creation of environmentally-friendly industry through advanced utilization of biomass

