

# 1988 Fiscal Year Final Research Report Summary

## Hydrolysis of Woody Material and Utilization by High Steam Reactor

Research Project

### Project/Area Number

61550717

### Research Category

Grant-in-Aid for General Scientific Research (C)

### Allocation Type

Single-year Grants

### Research Field

反応工学

### Research Institution

Kanazawa University

### Principal Investigator

**SAWADA Tatsuro** Faculty of Technology, Kanazawa University, Professor, 工学部, 教授 (80019728)

### Co-Investigator(Kenkyū-buntansha)

NAKAMURA Yoshitoshi Faculty of Technology, Kanazawa University, Assistant, 工学部, 助手 (20172455)

### Project Period (FY)

1986 – 1988

### Keywords

Explosion / Biomass / Enzymatic Saccharification / Fermentation / リグニンエポキシ樹脂

### Research Abstract

The application of bioprocess system for microbial conversion of lignocellulosic materials into energy was studied experimentally by using steam explosion process as pretreatment. Wood chips of *Larix leptolepis* and *Eucalyptus* were exploded at various pressures of steam and times of heating. The products were separated into water-soluble hemicellulose, cellulose, methanol-soluble lignin and Klason lignin. The effects of explosion on the concentration of methanol-soluble lignin, Klason lignin, hemicellulose, and cellulose were determined from the experimental data. The effect of explosion on the enzymatic saccharification was examined by using exploded wood samples. The explosion treatment was found to be effective for delignification of the wood and for increasing its susceptibility to enzymatic hydrolysis. The enzymatic hydrolysis and ethanol productivity were compared in three culture systems: a liquid cultures of two steps of the enzymatic saccharification and fermentation, and immobilized culture of cells, and a simultaneous culture of saccharification and fermentation. As a result, it was the most effective for producing alcohol from exploded wood. The conditions of optimal operation in this explosion system was evaluated from the contour map of plotting ratio of saccharification per unit energy consumption against steam pressure and reaction time. It was

realized that the ration of saccharification per unit energy consumption against steam pressure and reaction time in Larch attained to the maximum at 4.3 MPA of pressure and 3 minute of reaction time and that of eucalyptus attained to the maximum at 3.7 MPA and 2 minute.

## Research Products (10 results)

All Other

All Publications (10 results)

- [Publications] 桑原正章: 醱酵工学会誌. 63. 433-438 (1985) ▼
- [Publications] 沢田達郎: 化学工学論文集. 12. 1-6 (1986) ▼
- [Publications] Tatsuro Sawada: International Chemical Engineering. 27. 686-693 (1987) ▼
- [Publications] Tatsuro Sawada: Biotechnology Process. 259-265 (1987) ▼
- [Publications] 沢田達郎: 先端加工. 1988. (51-56) ▼
- [Publications] Masaaki Kuwahara; Tatsuro Sawada; Yasuhiko Asada; Seiji Tsunemoto, Yoshitoshi, Nakamura: "Explosion and Enzymatic Saccharification of Woods" Hakkokogaku. 63. 433-438 (1985) ▼
- [Publications] Tatsuro Sawada; Masaaki Kuwahara; Yoshitoshi Nakamura; Hiroshi Suda: "Effect of Explosion Operation for Effective Utilization of Biomass" Kagaku Kogaku Ronbunshu. 12. 1-7 (1986) ▼
- [Publications] Tatsuro Sawada; Masaaki Kuwahara; Yoshitoshi Nakamura; Hiroshi Suda: "Effect of a Process of Explosion for the Effective Utilization of Biomass" International Chemical Engineering. 27. 686-693 (1987) ▼
- [Publications] Tatsuro Sawada; Yoshitoshi Nakamura: "Explosion Operation and Biotechnological Application for Effective Utilization of Biomass" Biotechnology Processes. 259-265 (1987) ▼
- [Publications] Tatsuro Sawada; Yoshitoshi Nakamura; Yoshiaki Nakamoto: "Alcohol Fermentation and Plasticization of Biomass" Advanced Production Technology. 51-56 (1988) ▼

URL: [https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-61550717/615507171988kenkyu\\_seika\\_hokoku\\_](https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-61550717/615507171988kenkyu_seika_hokoku_)

Published: 1990-03-19