
 ABSTRACTS (MASTER THESIS)

**NMR analysis of interaction site between
carbohydrate binding module of cellulase and lignin**

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Human society has rapidly developed through exploitation of fossil resources. However due to the population explosion and economic growth, energy consumption increased to such an extent causing depletion of readily accessible oil. In addition, excessive use of oil resources disturbs atmospheric equilibrium causing global warming. To solve these problems toward establishment of sustainable society, utilization of renewable resources is strongly required. Cellulose is the most abundant biopolymer on the earth, and it provides glucose, a source for chemicals production by fermentation technology. For production of glucose from lignocellulosic biomass, enzymatic saccharification with cellulase is commonly used ^[1]. Typical fungal cellulase consists of catalytic domain (CD) and carbohydrate binding modules (CBMs). CBMs play a role to bring the catalytic domain in close proximity to the substrate to improve efficiency of the saccharification ^[2]. However, CBMs have affinity to lignin and the resultant non-productive binding of cellulase to lignin through CBMs strongly inhibits the activity of enzyme ^[3]. Nevertheless, the interaction mechanism has not been clearly understood, which makes the saccharification of lignocellulose more difficult. Understanding of the interaction between CBMs and lignin is pivotal to accomplish the effective enzymatic saccharification. To investigate the interaction of CBMs, point-mutagenesis has been applied ^[4], but the available information is limited near the mutation site and influenced by conformation changes caused by the replacement of amino acids. In this thesis, the interaction between CBM and lignin was analyzed using NMR. As a lignin sample, milled wood lignins (MWLs) from Japanese cedar and *Eucalyptus globulus* were used. From the NMR analysis and binding affinity measurement, the mechanism of non-productive binding was discussed.

References

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