
 ABSTRACTS (MASTER THESIS)

Studies on lytic polysaccharide monooxygenase (LPMO) from the selective white rot fungus, *Ceriporiopsis subvermispota*

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In the commence of the period sifted from fossil-based economy to biomass-based economy, woody biomass will be leading materials because of the large quantity, non-competing with food supply and the renewable. However due to lignocellulose binding to lignin and both being recalcitrance, the exploitation of woody biomass is challenging. A selective white rot fungus, *Ceriporiopsis subvermispota* is known as a basidiomycete decomposing preferentially lignin without significant damage to cellulose and separating cellulose from lignin¹. The selectivity for lignin degradation depends on culture conditions and both simultaneous and selective degradation has been observed during the wood decay by the fungus. *C. subvermispota* secretes cellulolytic enzymes, cellobiohydrolase, endoglucanase and β -glucosidase. In addition to the hydrolases, the fungus possesses the genes encoding lytic polysaccharide monooxygenases (LPMOs) which are known to boost cellulolytic enzyme activities on cellulose². LPMOs are copper-dependent enzymes that oxidize β -1,4-glycoside bond in the C1 or C4 position, or in the both positions of terminal sugar. Typical LPMOs require an electron donor such as ascorbic acid, cellobiose dehydrogenase and phenols. Recent studies suggested that lignin can serve as electron donor for LPMOs particularly in the presence of high-molecular-weight lignin and low-molecular-weight lignin but the redox mechanism is not well understood³. In this study, LPMO from *C. subvermispota* was expressed in *Pichia pastoris*, purified and characterized by focusing its cellulolytic activities in the presence of electron donor and lignin.

Recombinant LPMO from *C. subvermispota* was expressed in *P. pastoris* and purified using hydrophobic interaction, anion exchange chromatography and size exclusion chromatography. Cellopentaose were incubated with LPMO in the presence of ascorbic acid or milled wood lignin (MWL) or phenolic lignin β -O-4 model compound. Products were analyzed by LC and FT-ICR-MS. LPMO decomposed cellopentaose in the presence of ascorbic acid and MWL. The reaction with lignin model compound also gave the same reaction products. Detailed structures of the reaction products were identified by FT-ICR-MS.

References

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