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Determination of efficiency for enzymatic delignification of lignocellulosics using laccase

Rajiv Chandra Rajak and **Rintu Banerjee**
Indian Institute of Technology Kharagpur, India

Biological processes are becoming more competitive and gaining increased attention worldwide due to sustainability and eco-friendly nature. Biocatalyst, such as enzymes produced from microorganisms act as an effective green catalyst for biomass deconstruction. Laccase (oxidoreductase, EC 1.10.3.2) is a multicopper phenol oxidase enzyme that oxidizes electron-rich phenolic and non-phenolic substrates. Lignocellulosics such as *Saccharum spontaneum* (Kans grass), contains huge amount of carbohydrates in its cell wall and to make this enormous amount more accessible for hydrolysis and to be used further in fermentation, degradation of lignin through appropriate pretreatment process is an essential prerequisite of the complete biofuel production process. In the present work, laccase obtained from *Lentinus* sp. has been used for biomass deconstruction. The process was optimized through response surface methodology (RSM) based on central composite design (CCD) to investigate the effects of the different process parameters on biomass pretreatment. The maximum delignification obtained was 81.67% at 6 h of incubation time upon monitoring the initial lignin content of 17.46 %. Highest reducing sugar yield from enzyme-pretreated Kans grass was 500.30 mg g^{-1} substrate after 5.30 h of incubation time at a low cellulase loading. SEM (Scanning electron microscopy) analysis indicated changes in the surface characteristics, whereas FT-IR (Fourier transform infrared spectroscopy) shows that the pretreatment condition does not pose any major changes in the chemical nature of cellulose and hemicellulose. This work contributes towards the emergence of greener biomass pretreatment and utilization strategy.

Recent Publications:

1. Avinash A, Subramaniam D and Murugesan A (2014) Bio-diesel: a global scenario. Renewable Sustainable Energy Rev. 29:517-527.
2. Sudipta D and Rafael L (2015) Integrated enzymatic catalysis for biomass deconstruction: a partnership for a sustainable future. Sustainable Chem. Processes. 3:4.
3. Mukhopadhyay M and Banerjee R (2015) Purification and biochemical characterization of a newly produced yellow laccase from *Lentinus squarrosulus* MR13. Biotechnology. 5(3):227-236.
4. Rajak R C and Banerjee R (2016) Enzyme mediated biomass pretreatment and hydrolysis: a biotechnological venture towards bioethanol production. RSC Adv. 6(66):61301.
5. Nagula K N and Pandit A B (2016) Process intensification of delignification and enzymatic hydrolysis of delignified cellulosic biomass using various process intensification techniques including cavitation. Bioresour. Technol. 213:162-168.

Biography

Rajiv Chandra Rajak is currently pursuing his PhD from Indian Institute of Technology Kharagpur, India. He is working in the area of biomass deconstruction using biological catalsyt and its role in reducing sugar production.

rajivmbt@gmail.com