

Live

Biorefining of Lignocellulosic biomass for Biofuels and Value-added Products

Sachin Kumar

Biochemical Conversion Division, Sardar Swaran Singh National
Institute of Bio-Energy, Kapurthala-144601, India
Department of Chemical & Biological Engineering, South Dakota
School of Mines & Technology, Rapid City-57701, SD
E-mail: sachin.biotech@gmail.com

Abstract: The increasing prices of crude oil and the depleting non-renewable energy resources coupled with growing concern for climate change associated with the use of fossil-derived fuels have generated significant interest in renewable energy including bioenergy. Bioenergy generation from naturally abundant biomass resources has sparked rays of hope to cope with energy insecurity as well as greenhouse gas emissions. The development of transportation fuels and chemicals in biorefinery from non-edible resources and wastes is the current research focus globally. The effective use of lignocelluloses in large-scale applications can be developed through innovative research at the development and implementation of biorefineries. The lignocellulosic biomass is the best alternative natural resource that can be utilized for the production of biofuels such as bioethanol, biobutanol, hydrocarbons and other value-added products. Many current approaches focus on generating only single product, which results an uneconomical process. In biorefining, however, various components of the biomass are converted into biofuels, value-added products, and/or heat/power either through biochemical or thermo-chemical routes.

The major issues with the conventional methods using mesophiles in utilization of lignocelluloses are high retention time and low product yields. However, these issues can be undertaken using thermophilic strains/consortium due to its high catabolic activity and enhanced solubility of polymers at high temperature. Thermophiles have also distinct advantages over mesophiles in terms of fast growth rates, high metabolic rate of digestion, low risk of contamination and possess unique cellulolytic and hemicellulolytic systems. Therefore, biorefining of lignocelluloses for biofuels and other value-added products such as xylitol, single cell protein and/or lipids, aromatic compounds, etc. can be explored using thermophiles or combination of both thermophiles and mesophiles based on application. In such a manner the process can be made economically viable for utilization of lignocelluloses into biofuels.

Biography: Dr. Sachin Kumar has been working as a Visiting Professor in the Department of Chemical and Biological Engineering at the South Dakota School of Mines and Technology, Rapid City, USA and Deputy Director in the Biochemical Conversion Division at the Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala, India. Dr. Sachin Kumar completed his Ph.D. in Chemical Engineering from Indian Institute of Technology Roorkee, India. He has more than twelve years of research experience in Biochemical Conversion of Biomass to Biofuels including lignocellulosic ethanol, biogas, biohydrogen, etc. During his career at SSS-NIBE, he has developed the state of the art laboratory facilities for Biochemical Conversion of Biomass to Biofuels. He has completed four research projects and one consultancy project and actively engaged in three on-going research projects. He is co-ordinating for one of the projects under Indo-Brazil bilateral collaboration from Indian side. His area of research is biofuels including bioethanol, biogas, biobutanol, and biohydrogen, algal biomass, bioprocess engineering, enzyme technology, metabolic engineering, etc. Dr. Sachin has published more than 43 papers in peer reviewed journals, book chapters and papers in conference proceedings and 07 edited books. He has been granted one US patent and one filed patent in India. He has deposited some novel microorganisms in culture bank and their partial sequences in gene bank. He has delivered about 13 invited/plenary lectures and read more than 60 papers in national and international conferences. He has supervised 13 Masters and 5 Bachelors students, while 5 Doctoral and 4 Postdoctoral Fellows are under his supervision. He is a recipient of 2016 ASM-IUSSTF Indo-US Research



Professorship and selected as Bioenergy-Awards for Cutting Edge Research (B-ACER) Fellow 2016 by DBT and IUSSTF. He is serving as an editor, assistant editor and editorial board member of various peer reviewed journals. He is a life member of three professional societies. He is also a recipient of 'Bharat Jyoti Award' along with 'Certificate of Excellence' for contribution in R&D by India International Friendship Society and chaired technical sessions in national and international conferences. His advisees have received the best paper awards in the international conferences. He has coordinated three national & two international conferences and five national training programs.

Tuesday Feb 21st, CB#204W at 11 am