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Valorization of cellulosic bamboo biomass to reducing sugar via alkaline solution and ionic liquid pretreatment

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Non-renewability of fossil fuels and the challenges associated with its utilization such as price fluctuation due to political instability of oil rich regions, environmental concerns, imbalance between energy supply and population growth and uneven distribution of these resources in the globe are some of the compelling factors to research for sustainable and renewable energy resources. Biomass is one of the most promising candidate along with solar, wind and hydrothermal energies for sustainable and renewable energy demand. Being the most abundant and bio-renewable resource, lignocellulosic biomass has the potential to serve as feed stock for the production of second generation bioethanol and platform chemicals without computing with food supply. Lignocellulosic biomass is composed of three bio-polymeric components: cellulose (35–50%), hemicellulose (20–35%) and lignin (5–30%). In this work, hydrolysis of cellulosic bamboo biomass (CBB) was investigate for sugar production using the most commonly known hydrophilic ionic liquid, 1-butyl-3-methyl imidazolium chloride ([BMIM] Cl), in the presence of sulphuric acid. CBB was regenerated from the alkaline pre-treatment of bamboo biomass and subsequently dissoloution in [BMIM] Cl and was then hydrolyzed using dilute sulphuric acid. The effect of pretreatment steps on the crystallinity index, morphology, chemical, thermal properties, ultimate and proximate properties was investigated using XRD, SEM, FTIR, TGA and Elemental analysis characterization techniques. The amount of total reducing sugar (TRS) produced was determined by 3, 5-dinitrisalcylic acid (DNS) method using UV-Visible spectroscopy. It was observed that CBB prior dissolution in [BMIM] Cl, effectively enhanced the yield of TRS (80%).

Biography

Samuel Kassaye has completed his Master of Technology from Indian Institute of Technology, Kanpur, India in Chemical Engineering in 2011. He is currently a PhD Scholar at Indian Institute of Technology, Delhi, India at Chemical Enginnering department under the supervison of Kamal K Pant and Dr. Sapna Jain from Alabama State University, USA.

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