International Journal of Innovative Research in Science, Engineering and Technology 2021, Vol. Issue S6

Preparation and evaluation of hybrid polymer-based materialsfrom autohydrolysis-treated plant biomass

Chikako Asada

Kanazawa University

Abstract

The utilization of plant biomass as a resource of producing fuel and materials instead of fossil resources, i.e. oil, coal, and natural gas, can reduce CO2 emission and realize a low carbon society. The autohydrolysis treatmentwith high pressure and high temperature, a thermochemical pretreatment method for plant biomass, is a chemical-free method because it only uses hot steam. This study proposed a new effective and environmentally friendly biorefinery system of unutilized plant biomass, i.e. waste Bo-de chopsticks, using the autohydrolysistreatment followed by milling treatment, and then water and acetone extractions. The water extract, the acetone extract, and the residue after the extractions obtained from the autohydrolyzed waste Bo-de chopsticks were converted into methane gas, lignin epoxy resin, and cellulose nanofiber. The water extract and the residue after the extractions were used as substrates for the methane gas production. Furthermore, after bleaching the residue after the extractions, it was used as a raw material for producing a cellulose nanofiber (CNF) as shown in Figure 1. The maximum specific tensile strength of CNF, i.e. 110 MPa/(g/cm3), was obtained at a steam temperature of 200oC (a steam pressure of 1.5 MPa) and steaming time of 5 min. The acetone extract, a low molecular weight lignin, was used not only a raw material of epoxy resin but also a curing agent. The almost lignin-derived cured epoxy resin showed a good thermal and mechanical property required in the electronic material field. This biorefinery system in this work seems to be very useful for the total effective utilization of not only waste Bo-de chopsticks waste but also other un-utilized plant biomass..

Biography:

She has completed her PhD at the age of 26 years from Kanazawa University and studied about biochemical engineering in Faculty of Bioscience &Bioindustry, Tokushima University. Currently she is studying on woody biomass conversion technologies, with expertise in the production of biofuels and the synthesis of renewable-based materials from cellulose and lignin contained in the plant biomass.

References

1. Asada C, Sasaki C, SuzukiA, Nakamura Y (2018) Total biorefineryprocess of lignocellulosicwaste using steam explosion followed by water and acetone extractions. Waste and Biomass Valorization 9: 2423-2432.
2. Asada C, Sasaki C, Nakamura Y (2019) High concentration ethanol Production from mixed softwood sawdust waste. Waste and Biomass Valorization 10: 433-439.
3. Asada C, Sasaki C, Oka C, Nakamura Y (2020) Ethanol production from sugarcane bagasse using pressurized microwave treatment with Inorganic salts and salt-tolerant yeast. Waste and Biomass Valorization 11: 2001-2007

Citation: Chikako Asada has her expertise in biomass effective utilization and bioremediation. International conference on material science and engineering, Dubai, UAE, May 24-25, 2021.