論文 / 著書情報
Article / Book Information

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Title(English)	Dissolution Process Model of Rice Straw Particles in 1-Ethyl-3-Methylimidazolium Acetate at Elevated Temperatures
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Thesis outline

Introduction: Overall Introduction to Lignocellulosic Biomass Pretreatment

It provides a basic overview of issues related to biomass pretreatment engineering which is the initial process for treatment or conversion of biomass in order to utilize it for chemical feedstocks and fuels. Existing technologies have merit and demerit. The objective of this study was to use an ionic liquid to dissolve Japanese milled rice straw.

Chapter 1: Literature Review - Lignocellulosic biomass dissolution in Ionic Liquid

It gives a broad review of published papers in the field of biomass dissolution, ionic liquid properties, problems in the field and also the merit for using ionic liquids specifically, 1-Ethyl-3-Methyl- imidazolium Acetate for biomass dissolution process modeling.

Chapter 2: Rice straw sample preparation and characterization

It presented resulted on pre-treatment processing of the rice straw by ball-milling and materials characterization of the resulting powder which was on the order of 75-100 μm in diameter. Ball-milling temperature at 60ºC significantly reduced the rice particle crystallinity whereas milling at liquid nitrogen temperature preserved the crystallinity. Higher milling temperature enhanced the amorphization of the milled powder.

Chapter 3: Dissolution Model of Ball-Milled Rice Straw Particles in 1-Ethyl-3-Methylimidazolium Acetate at Elevated Temperatures

It presented and discussed results on the dissolution of the rice straw powder. Two different numeric ratios were presented in order to measure the dissolution rate of the rice straw powder when treated at 120ºC-160ºC in the ionic liquid solution versus heating time.

Chapter 4: Optical and Confocal Microscopic Studies on Dissolution of Rice Straw Particle in 1-Ethyl-3-methylimidazolium Acetate

It presented results conducted at temperatures of 120ºC-160ºC where dissolution was accelerated at higher temperatures. The results were fitted by linear

regression and showed a high correlation coefficient indicating the overall dissolution process was linear.

Overall Conclusions

It summaries the research results and dissolution process model of rice straw in 1-Ethyl-3-Methyl imidazolium Acetate at elevated temperature of both milling temperature and the ionic liquid heating temperature significantly influenced the dissolution rate of the particles and also impacted the particle morphology during the dissolution. Further research work follows the conclusions and proposes to validate the dissolution process model on other types of biomass.