

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
著者(和文)	Hlaing Hlaing Myint
Author(English)	Hlaing Hlaing Myint
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種別(和文)	論文要旨
Type(English)	Summary

(博士課程)
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論文要旨

THESIS SUMMARY

専攻 : International
Department of Development
Engineering 専攻

学生氏名 : Hlaing Hlaing Myint
Student's Name

申請学位(専攻分野) : 博士
Academic Degree Requested Doctor of (Engineering)

指導教員(主) : Jeffrey S. Cross
Academic Advisor(main)

指導教員(副) : Hirofumi Hinode
Academic Advisor(sub)

要旨(和文 2000 字程度)

Thesis Summary (approx.2000 Japanese Characters)

Over the last decade, ionic liquids (ILs) were used as green solvents for dissolution of lignocellulosic biomass for potential usage as a chemical feedstocks and liquid fuels. Extensive research has explored acetate based imidazolium ionic liquids that are effective on lingo-cellulose biomass dissolution. However, using ionic liquids on Japan crop residues has been limited to date. Furthermore, there are no reports on the interaction between the IL and the rice straw particle from a microscopic point of view during the dissolution process that is needed to reduce the dissolution energy which was the purpose of this thesis.

The rice straw (RS) was ball-milled at temperatures of 60°, 25°, and -196°C into a fine powder that was sieved, dissolved in 1-ethyl-3-methylimidazolium acetate [Emim][OAc] and heated on a hot plate at temperatures of 120-160°C. The dissolution process was followed ex-situ by observation using optical and confocal microscopes. Comparative studies of the particle dissolution rate based on the changes of light intensity and fluorescence of the time-elapsd photographs aided the end point determination of the dissolution.

Ball milling resulted in significant particle size reduction as well as physio-chemical changes. The chemical composition and crystallinity index changed due to ball-milling based upon XRD measurement and FTIR spectroscopy as well as the impacted surface area and roughness.

The rice straw particle dissolution data were fitted by linear regression by taking a ratio of particle light intensity and particle cross-sectional area as a function of heating time.

The rice straw particle color intensity and ionic liquid surrounding the particle also changed during dissolution which was analyzed by a UV-Vis spectrophotometer. The ionic liquid color became a homogeneous amber solution as the particle dissolved progressed which could also be used as indicator of the dissolution process. In conclusion, we have gained new insight into the rice straw particle dissolution process in ionic liquid with greater understanding of the key parameters in creating an eco-friendly efficient biomass dissolution process using [Emim][OAc].

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).

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