UNIVERSITI TEKNOLOGI MARA

PRETREATMENT OF OIL PALM FROND BY COMBINED ELECTRON BEAM IRRADIATION AND IONIC LIQUID METHOD

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MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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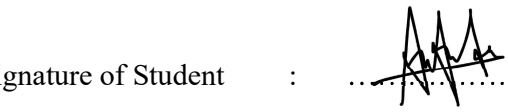
Signature of Student	:	
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ABSTRACT

For the past years, pretreatment of lignocellulosic biomass has been studied prior to the production of valuable chemicals from natural sources as second generation biofuels. In this research, pretreatment of OPF using combined electron beam irradiation (EBI) and ionic liquid (IL) method was conducted. The effect of pretreatment on the biomass was studied. Irradiation doses of 100-1000 kGy with the use of 50% v/v 1-ethyl-3-methylimidazolium acetate [EMIM][Ac] as ionic liquid were used in the investigations on the effect of pretreatment on oil palm frond (OPF) and microcrystalline cellulose (MCC) at 3 different conditions which are non soaked (NS), water soaked (WS) and ionic liquid soaked (ILS). TAPPI method adopted reported on the percentage of alpha, beta and gamma cellulose on untreated and pretreated OPF. Fourier Transform Infrared Spectroscopy (FTIR) and X-Ray diffraction (XRD) readings justified the findings on the effect of EBI-IL method on both OPF and MCC. The mechanism of combined EBI and IL pretreatment was analyzed from the aspect of composition of biomass, crystallinity index and lateral order index. The result show that the combined EBI and IL pretreatment can significantly deconstruct the biomass composition by degrading the hemicellulose and lignin content in lignocellulose and reducing crystallinity of cellulose. These results show its favor for the next enzymatic hydrolysis process in the production of biofuels by lignocellulosic biomass.

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TABLE OF CONTENTS