

DISSOLUTION OF SUPERHEATED STEAM-TREATED OIL PALM BIOMASS FIBER IN IONIC LIQUID FOR THE PRODUCTION OF ELECTROSPUN NANOFIBER

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Abstract: The use of ionic liquid has been considered as the emerging method for cellulose processing. In the production of electrospun nanocellulose fiber, dissolution of cellulose in solvent is important in order to ensure the formation of good nanofiber. In this study, oil palm biomass fiber was used for the production of nanofiber. Superheated steam (SHS) treatment was conducted at 260°C for 30 minutes followed by delignification using NaClO₃ in order to remove hemicellulose and lignin. Control cellulose sample was prepared by treating the oil palm biomass with KOH and NaClO₃. Cellulose obtained was dissolved in combined ionic liquids (IL): 1-ethyl-3-methylimidazolium acetate and 1-decyl-3-methylimidazolium chloride. Effects of cellulose dissolution in different concentrations were also evaluated. Electrospun nanocellulose fiber was successfully obtained by dissolution of SHS-treated oil palm biomass cellulose in the combined ILs. It was found that fiber diameter, morphological structure and spinnability of the nanofiber obtained were greatly influenced by lignin and hemicellulose content. This study revealed the possibility of utilizing lignocellulose from oil palm biomass treated with non-toxic chemicals for nanofiber production. Moreover, it represents a step forward into the search for environmentally friendly methods as an alternative to hazardous chemical pretreatment approach.