



AN ENVIRONMENTALLY FRIENDLY METHOD FOR MICROFIBRILLATED CELLULOSE EXTRACTION FROM HEMP

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ABSTRACT

Microfibrillated cellulose is a new biomaterial having astonishing intrinsic properties. It was first used in nanocomposites due to its environmentally friendly nature and mechanical reinforcement. It has found various other uses and particularly in a high-value applications [1]. That is why significantly has been increasing interest in development of environmentally friendly technologies of microfibrillated cellulose (MFC) extraction from plants.

Hemp fibres are renewable, cellulose rich material that can be used for production in different areas. However, some of the applications in nanocomposites are limited by such components of the plant cell wall as hemicellulose, pectin/waxes and lignin.

In this article disintegration of hemp fibres from variety *Purini* grown in Latvian Agricultural Science Centre of Latgale by steam explosion and ultrasound treatment were investigated with the aim to evaluate steam explosion (SE) pre-treatment influence on hemp fibre microstructure and ultrasound treatment effectiveness investigation on cellulose disintegration processes into microfibrillated cellulose.

During the SE, the biomass is subjected to the treatment with high pressure saturated steam and rapid decompression resulting in substantial breakdown of the lignocellulosic structure, hydrolysis of hemicelluloses, depolymerisation of lignin components and defibrillation [2]. Removal of lignin by water and alkali treatment after SE used in this research makes the cellulose accessible for further ultrasound treatment and nanotechnologic processing.

The acquired results after steam explosion treatment and water and alkali treatment are discussed and interpreted by Fourier transform infrared spectroscopy (FTIR). Scanning electron microscopy (SEM) was used to examine the microstructure of hemp fibres before and after each treatment.

Keywords: steam explosion, hemp fibre, cellulose, microfibrillated celluloses

Literature:

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