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Synthesis of Nanocellulose from Rice Straw**Wickramasinghe W.A.W.I.C.¹, Lasitha D.S.¹, Samarasekara A.M.P.B.^{1*},
Amarasinghe D.A.S.¹, Karunanayake L.²**¹*Department of Materials Science and Engineering, University of Moratuwa, Sri Lanka*²*Department of Chemistry, University of Sri Jayewardenepura, Sri Lanka***banduamp@gmail.com***Abstract**

Polymers are composed of very high molecular masses formed by the combination of large number of simple molecules. They are a highly diverse class of materials which are available in all fields of engineering today. Polymers can be classified into two different types namely naturally occurring polymers and synthetic or man-made type polymers. Naturally occurring bio-polymers were known materials before synthetic polymers appeared in the society. Synthetic polymers have a negative impact on ecosystems due to non degradable nature after the specific purpose. Bio-based polymers have become feasible alternatives to conventional petroleum-based polymers in sustainable development. Nanomaterials are considered as a critical tool for various sectors such as textiles, energy, environment, electronics, photonics, food, agriculture, biomedicine and health care. Nano scale materials provide superior properties due to their high surface area compared to their respective bulk structure. Rice is the most important crop occupying approximately 35 percent of the total cultivated area in Sri Lanka. Approximately 1.8 million farm families are occupied in paddy cultivation in the country. Rice straw is the major waste component that appears product of rice harvest. It is not currently used to convert into value added product. The cellulose is the most abundant renewable bio-polymer resource available on earth today. The rice straw of BG 352 was collected after harvesting in 2018 from Polgahawela paddy cultivation area in Sri Lanka for this research. Cellulose was extracted from agricultural waste using dewaxing, delignification and hemicellulose and silica removal treatments. Extracted cellulose was characterized by Fourier transform infrared spectroscopic technique (FTIR). SEM images revealed that isolated cellulose was mostly in the form of fibers with diameters ranging from 2-8 μm . The cellulose can be extracted from rice straw with high purity level. The yield of extracted cellulose is around 21%. Nano crystalline cellulose is a light solid substance can be obtained from plant matter which comprises nano sized cellulose material. This type of nanocellulose can be used in pharmaceutical, food and medical industries. Nanocellulose can be used as a food packaging material that prevents the spoiling of food contents and entry of oxygen in the food contents. Nano crystalline cellulose was synthesized from cellulose by following the acid hydrolysis, quenching, centrifugation, dialysis sonication and freeze drying processes in this research. Synthesized nano crystalline cellulose materials were identified as 5-70 nm diameter using SEM images. Therefore, locally available rice straw can be used as a source to synthesize nano crystalline cellulose.

Keywords: Nanocellulose, Cellulose, Rice straw, Nanomaterial