

**EXTRACTION AND CHARACTERIZATION OF MICRO  
CELLULOSE FROM SALVINIA MOLESTA**

Ashani Rhythmi Abeyweera

179426X

Master of Materials Science

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Thesis submitted in partial fulfillment of the requirements for the degree

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## **DECLARATION**

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The above candidate has carried out research for the Master's thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Mr. A.M.P.B. Samarasekara

Signature of the Supervisor:

Date:

## **DEDICATION**

This thesis is dedicated to my parents and my sister for their love, endless support, and encouragement. And to my supervisor for his guidance and assistance. And finally, the people who inspired me and shared my passion.

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## Abstract

*Salvinia molesta* is an aquatic weed that is widely spread all over the world with an incredibly high growth rate. Because of its capacity to quickly cover the entire water body, it has historically provided a significant issue and currently poses a significant challenge. This plant has been managed and eliminated from water bodies using a number of biological, physical, and chemical strategies. Any of these techniques, however, revealed to be a long-term solution because it would be costly and time-consuming to implement. With its many remarkable features and wide range of possible uses, micro cellulose is a young and promising material that has attracted growing scientific interest over the decade.

The objective of this research was to extract cellulose from *Salvinia molesta* and make micro cellulose fibrils (MCFs) and micro cellulose crystals (MCCs) through the chemical treatments and physical processes. Cellulose isolation necessitated several pretreatment steps, including soxhlet extraction, alkaline treatment, and bleaching. Through the utilization of ultra-sonication, hydrolysis, and freeze-drying techniques, pure microcrystalline cellulose (MCC) and microcrystalline cellulose fibers (MCF) were obtained post-extraction. The raw *Salvinia molesta*, de-waxed, alkali-treated, bleached, and MCCs and MCFs samples underwent characterization using Fourier transform infrared spectroscopy, X-ray diffraction, thermogravimetric analysis, differential scanning calorimetry, and scanning electron microscopy.

Keywords: *Salvinia molesta*, micro cellulose, micro cellulose fibres, micro cellulose crystals

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## LIST OF ABBREVIATIONS

%	Percentage
C°	Degree Centigrade
µm	Micro meters
BNC	Bacterial Nano Cellulose
C <sub>I</sub>	Crystallinity Index
cm	Centimeters
CMC	Cellulose micro crystals
CMF	Cellulose micro fibres
Con.	Concentrated
DSC	Differential Scanning Calorimetry
FTIR	Fourier Transform Infrared Spectroscopy
G	Gram
I <sub>200</sub>	Intensity of Crystalline Cellulose
I <sub>am</sub>	Intensity of Amorphous Cellulose
ml	Milliliters
mm	micro meters
<i>S. molesta</i>	Salvinia molesta
SEM	Scanning Electron microscopy
TGA	Thermogravimetric analysis
wt	Weight
XRD	X-ray Diffraction Analysis