

## Accepted Manuscript

Isolation of cellulose nanocrystals from plum seed shells, structural and morphological characterization

Adriana Nicoleta Frone, Ioana Chiulan, Denis Mihaela Panaitescu, Cristian Andi Nicolae, Marius Ghiurea, Ana-Maria Popescu

PII: S0167-577X(17)30239-2  
DOI: <http://dx.doi.org/10.1016/j.matlet.2017.02.051>  
Reference: MLBLUE 22153

To appear in: *Materials Letters*

Received Date: 4 December 2016  
Revised Date: 10 February 2017  
Accepted Date: 16 February 2017

Please cite this article as: A.N. Frone, I. Chiulan, D.M. Panaitescu, C.A. Nicolae, M. Ghiurea, A-M. Popescu, Isolation of cellulose nanocrystals from plum seed shells, structural and morphological characterization, *Materials Letters* (2017), doi: <http://dx.doi.org/10.1016/j.matlet.2017.02.051>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## Isolation of cellulose nanocrystals from plum seed shells, structural and morphological characterization

Adriana Nicoleta Frone\*, Ioana Chiulan, Denis Mihaela Panaitescu\*, Cristian Andi Nicolae, Marius Ghiurea, Ana-Maria Popescu

National Institute of Research and Development in Chemistry and Petrochemistry, 202 Splaiul Independentei, 060021, Bucharest, Romania

*\*Corresponding authors*

E-mail addresses: [ciucu\\_adriana@yahoo.com](mailto:ciucu_adriana@yahoo.com); [panaitescu@icf.ro](mailto:panaitescu@icf.ro);

Phone number: +4 021 312 30 68

### **Abstract**

Plum seed shells (PS) have been successfully used as a source for cellulose nanocrystals isolation. Alkali treatment or hot-water extraction and acid hydrolysis removed non-cellulosic components and released cellulose nanocrystals (CNC). CNC with different lengths between 100 and 800 nm and no more than 14 nm in height were detected by AFM. The crystallinity strongly increased after these treatments, from 38 % for raw PS to 51 % and 54 % depending on the treatment, due to hemicelluloses and lignin removal. The results showed that a low-cost by-product of food industry can be converted into a valuable material, cellulose nanocrystals.

Keywords: Plum seed shells, Cellulose, AFM, Biomaterials, Thermal analysis, X-ray diffraction

### **1. Introduction**

Many food and agricultural residues were studied as sources of high added value products like nanocellulose [1-5]. Cellulose nanocrystals (CNC) and nanofibers (CNF) are valuable biomaterials with a wide range of applications, from medical, cosmetics and food to paperboard, electronics and body armor [6-9]. CNC and CNF are increasingly studied as reinforcements in bioplastics, only a few percentages of these nanofillers determining significant increase of mechanical properties [10]. The isolation of nanocellulose from wastes or by-products is attractive both in economic terms and regarding environmental responsibility. Wheat straw, rice or corn husks,

Download English Version:

<https://daneshyari.com/en/article/5463336>

Download Persian Version:

<https://daneshyari.com/article/5463336>

[Daneshyari.com](https://daneshyari.com)