OBTAINING ANTIBACTERIAL ECOLOGICAL NONOCELLULOSE FIBRE FROM ROSE PLANT

Elçin Tören

Sekce – TEXTIL
Fakulta textile, 2. ročník
Magisterský program studia - NANOMATERIÁLY A NETKANÉ TEXTILIE

Abstract: The aim of this study is to produce biodegradable, biocompatible and compatible ecological nano textile materials used in medical applications.
Keywords: Ecological nanofiber, rose plant, antibacterial, antimicrobial, anticarcinogenic.

1.INTRODUCTION

World population is constantly increasing and, accordingly, brings with it several problems, such as environmental problems such as global climate changes, epidemics, depletion of the ozone layer, acid rains, toxic residues, air and water pollution. Thus, consumers and producers are expected to pay more attention to human health and the protection of nature [1].

Since the rose plant is a natural material and it has many positive effects on human skin and health thanks to its ingredients, it is produced in the form of nanocellulose fibre and allows use in many areas as medical textiles area. Rose plant has substances such as geraniol and nicotinamide have a few useful impacts on the skin and cells. The present-day examinations on the rose plant have been affirmed the antiviral, antibacterial, anticancer, upper, antioxidant, pain-relieving, anti-inflammatory, anticonvulsant exercises and its relaxant and trancelike impacts. If we talk about the important properties of nanocellulose fibres, these [2]:

- Nanocellulose fibres are not as it were light in weight, but too have tall quality and are of intrigued for numerous applications in a wide run of areas.
- Nanocellulose fibre may appear as a cheaper option to expensive fibres such as Kevlar, carbon fibre and glass fibre for most applications.

- Nanocellulose advertise is likely to witness an amazing around 18% during the estimated period. The developing utilize of maintainable items with superior fabric science in created economies and the expanding asset imperatives moving slowly towards the showcase request for bio-based items are the major components impelling the development of the showcase amid the estimated period.
- By obtaining the form of nanocelluloses from the rose plant, an ecological new biomaterial with new bioorganic biodegradation properties, in which all these features are combined, is medically produced.

By obtaining the form of nanocelluloses from the rose plant, an ecological new biomaterial with new bioorganic biodegradation properties, in which all these features are combined, is medically produced.

1.2. Effect of Rose Plant Against Various Diseases

1.2.1. Antibacterial effect

In vitro methanol and delicious rose petals extricate appeared antiviral action against HIV disease by focusing on diverse stages of the HIV replication cycle. Kaempferol and its subsidiaries influence viral protease the antiviral movement of the most components of citronellol, geraniol in rose plant substance has been affirmed against HSV-1, Haemophilus parainfluenza sort 3.22 [3].

1.2.2. Anticancer activity

These materials successful to anti-tumor, anti-carcinogenic and cytotoxic impacts of against cancer cells were affirmed. These properties occur by Geraniol [3].

2.EXPERIMENT

Rose plants parts of the received rose plant have been pre-conditioned cellulose extraction was done with alkali treatment. At long last, a de-waxing step was carried out: bubbling in a blend toluene/ethanol (2:1 volume/volume) in a Soxhlet for 6 hours after that washed in ethanol and dried.

2.1 Procedure

Firstly, dry form rose plants plant of water at 90°C. The washed material was filtered on a large porous paper. The solid was dried in an oven at 60 ° C for 2 hours. The material was then refilled with ethanol in a cellulose cartridge for 2 hours at 90 ° C in an embodiment called Soxhlet. The antacid treatment was done by blending 5 grams of this fabric with 0.06 L of 45 g/L NaOH, and it was hydrolysed for 2 hours at 80°C. After this time, the response was ceased by cooling in an ice shower and filtered on thick pore filter paper. Gotten strong was dried in a stove for 5 hours at 50°C. The dried material was bleached as follows a mixture of 5 grams of solid of 60 g/L NaOH and 160 g/L H_2O_2 was hydrolysed for 90 min at 55°C, the material was then separated by filtration technique and washed.

2.2. Nanofiber Production

Nanofibers were prepared by the acid hydrolysis of obtained celluloses. The acid hydrolysis was carried out with sulphuric acid (H_2SO_4) solution 60 wt.% at 45 C^0, 30 min.

Fig 1. *Diagram of the method to get cellulose nanofibers from lignocellulosic filaments [4].*

3.EXPERIMENTAL RESULTS and ANALYSIS

Chemical composition of the Rose plants contains holocellulose, α-cellulose, lignin, and ash [4]. The biomass yield of the Rose plant at each stage of the extraction process indicates the subsequent recovery of the material during the production of crystalline cellulose (Table 1).

In this project, bleaching was effective to separate cellulose present in Rose plants. These reports correspond essentially to materials obtained with nanometric dimensions, nanocrystals or nanofibers, after acid hydrolysis.

3.1. Yield Analysis

In this section includes biomass yield analysis after chemical treatment for 100 grams rose plants.

Tab.1. *The y*ield obtained after chemical processes based on biomass (%)

Process	**Treatments**	**Yield (g/100 g Rose plant)**
Conventional	Alkaline	66.9 ± 0.1
	Bleaching	87.7 ± 2.5
	Acid hydrolysis	19.1 ± 0.7
Proposed	Delignification	88.0 ± 0.4
	Bleaching	77.0 ± 2.1
	Acid hydrolysis	17.2 ± 0.8

3.2.SEM analysis

In this part shows a comparative SEM image of nanocellulose fibres obtained from different cellulose types and nanocellulose fibres obtained from rose plants.

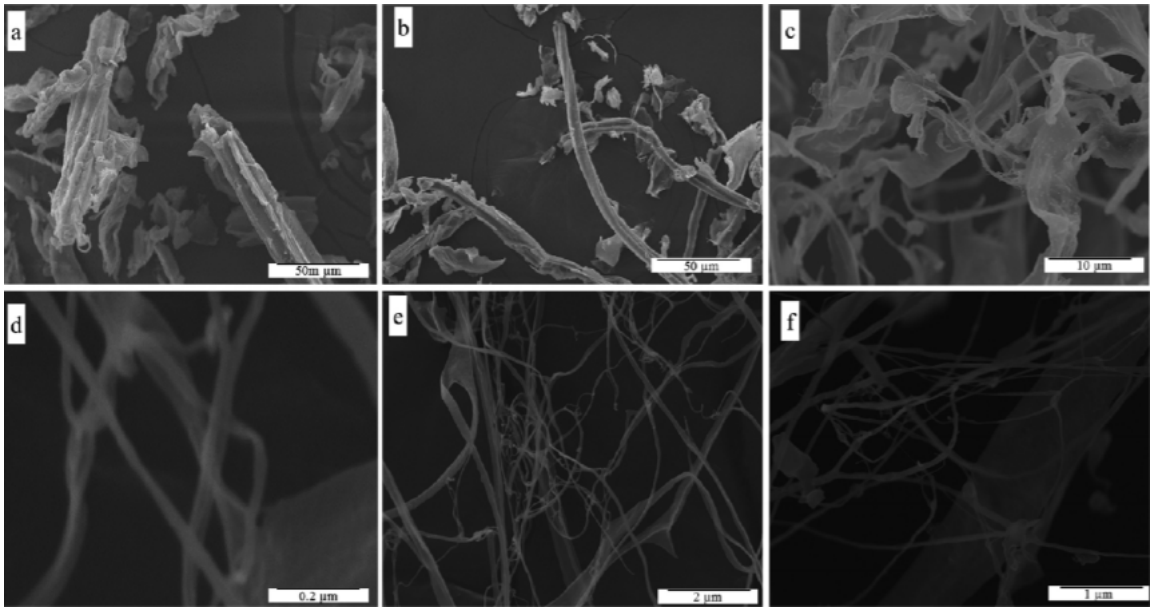

Fig. 2. *SEM images of bleached fibres (a, b) and freeze-dried: crystalline cellulose, conventional process (c, d) CNFs from Rose plants (e, f),the proposed process*

4. CONCLUSION

Nanocellulose may be a normally biodegradable fabric that is exceedingly appropriate for the biomedical industry. Immaculate nanocellulose is non-toxic to people and is biocompatible. In this manner, it can be utilized for healthcare applications such as individual cleanliness items, makeup, and biomedicines.

Adjusted nanocellulose fibres can be a successful carrier for the transport of chemicals and other drugs since its pore sizes are nano scale, such a carrier can enter complex skin pores and treat skin infections. Similarly, it can be used as a soft but active peeling agent in cosmetics Together with all these effects, it combines the active ingredients in the content of the rose plant, making it possible to produce an effective nanomaterial for medical applications with its antibacterial and anticarcinogenic effect.

The nanocellulose fibres obtained from the rose plant are a new biomaterial that can be used in areas such as medical textile tissue engineering, since it does not contain complex forms and is a completely natural material.

5.REFERENCES

[1] ECO Belgelendirme - ECOmark Uluslararası EKO Etiketi ve Belgesi. *Ecomark.com.tr* [online]. 2020 [accessed. 22 . May 2020]. Retrieved z: https://www.ecomark.com.tr

[2] JASMANIA, L. Preparation of nanocellulose and its potential application. *International Journal of Nanomaterials, Nanotechnology and Nanomedicine* [online]. 2018, vol. 4, no. 2, pp. 014-021. Retrieved z: doi:10.17352/2455-3492.000026

[3] MAHBOUBI, MOHADDESE. Rosa damascena as holy ancient herb with novel applications. *Journal of Traditional and Complementary Medicine* [online]. 2016, vol. 6, no. 1, pp. 10-16 [accessed. 22 . May 2020]. Retrieved z: doi:10.1016/j.jtcme.2015.09.005

[4] NG, HON-MENG, LEE TIN SIN, TIAM-TING TEE, SOO-TUEEN BEE, DAVID HUI, CHONG-YU LOW and A.R. RAHMAT. Extraction of cellulose nanocrystals from plant sources for application as reinforcing agent in polymers. *Composites Part B: Engineering* [online]. 2015, vol. 75, pp. 176-200. Retrieved z: doi:10.1016/j.compositesb.2015.01.008

[5] SUN, X.F., F. XU, R.C. SUN, P. FOWLER and M.S. BAIRD. Characteristics of degraded cellulose obtained from steam-exploded wheat straw. *Carbohydrate Research* [online]. 2005, vol. 340, no. 1, pp. 97-106. Retrieved z: doi:10.1016/j.carres.2004.10.022