# BOOK of ABSTRACTS


## 2nd International Conference on Advanced Production and Processing

## 20th-22nd October 2022

## Novi Sad, Serbia

**Title:**
Book of Abstracts of the 2nd International Conference on Advanced Production and Processing publishes abstracts from the following fields: Innovative Food Science and Bioprocesses, Nutraceuticals and Pharmaceuticals, Sustainable Development, Chemical and Environmental Engineering, Materials Design and Applications, Petroleum Refining and Production.

**Publisher:**
University of Novi Sad, Faculty of Technology Novi Sad,
Bulevar cara Lazara 1, 21000 Novi Sad, Serbia

**For publisher:**
prof. Biljana Pajin, PhD, Dean

**Editorial board:**
Jovana Petrović, Ivana Nikolić, Milica Hadnađev Kostić, Snežana Škaljac, Milana Pribić, Bojan Miljević, Branimir Pavlić, Olga Govedarica

**Editor-in-Chief:**
Prof. Zita Šereš, PhD

**Design and Printing Layout:**
Saša Vulić

CIP - Каталогизација у публикацији
Библиотеке Матице српске, Нови Сад

658.5(048.3)

INTERNATIONAL Conference on Advanced Production and Processing (2 ; 2022 ; Novi Sad)
Book of abstracts [Elektronski izvor] / 2nd International Conference on Advanced Production and Processing, 20th-22nd October 2022, Novi Sad ; [editor-in-chief Zita Šereš]. - Novi Sad : Faculty of Technology, 2022

Način pristupa (URL): https://www.tf.uns.ac.rs/download/icap-2022/book-of-abstracts.pdf. - Opis zasnovan na stanju na dan 14. 10. 2022. - Nasl. s naslovnog ekrana.

ISBN 978-86-6253-160-5

a) Технологија - Производња - Апстракти

COBISS.SR-ID 77341961

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ICAPP 2022
2nd International Conference
on Advanced Production and Processing

# CHITOSAN- AND PECTIN-BASED COATINGS WITH INCORPORATED ACTIVE COMPONENTS FOR APPLICATION IN ACTIVE FOOD PACKAGING

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The subject of this research was the development of biodegradable and eco-friendly material based on natural biopolymers from renewable sources, with the addition of active components for application in active food packaging. The main principle was the incorporation of the active components (lemongrass (*Cymbopogon citratus* L.) essential oil, ZnO nanoparticles, or $Zn(CH_3COO)_2 \cdot 2H_2O$) with antimicrobial activity in the polymer matrix (chitosan, pectin, and gelatin), and their slow release during the time. All of the used components are listed as GRAS (Generally Recognized as Safe) by the U.S. Food and Drug Administration. Different formulations of emulsions and dispersions were processed for mutual comparison. The stability of chitosan and pectin emulsions was determined by using laser diffraction methods. Chitosan emulsions exhibited higher stability during 30 days of storage. The chitosan emulsions and dispersions exhibited a higher antibacterial effect *in vitro* against *Escherichia coli*, *Bacillus subtilis*, and *Staphylococcus aureus*. Biopolymer coatings were formed by the spraying of emulsions on existing packaging. The effects of biopolymer coatings on the development of microorganisms on fresh raspberries (*Rubus idaeus* L.) were performed *in vivo* during eight days of raspberry storage at refrigerator temperature. The tested coatings extended the shelf life of stored raspberries from four to eight days. The synergistic effect between lemongrass essential oil and ZnO nanoparticles or $Zn(CH_3COO)_2 \cdot 2H_2O$ was observed both *in vivo* and *in vitro*.

*Keywords: Biopolymers, Active components, Emulsions, Active packaging*

*Acknowledgements: This work was financially supported by the Serbian Ministry of Educations, Science and Technological Development, Contract No. 451-03-68/2022-14/200053.*