ISSN: 2718-2177

International Conference

S+M(L)=KI[14]

24th and 25th February 2022

XIV Meeting of Young Chemical Engineers

www.fkit.unizg.hr/smlki

Faculty of Chemical Engineering and Technology Zagreb

Croatian Society of Chemical Engineers

EuChemS
European Chemical Society

BOOK OF ABSTRACTS

Knjiga sažetaka

Zagreb, Croatia, 24th and 25th February 2022

Hanna Instruments nudi široki spektar uređaja za laboratorijsku analizu. Neprestano ulažemo u istraživanje i razvoj kako bismo poboljšali svoje znanje i proširili naše tehnologije.







HANNA® instruments

HANNA INSTRUMENTS d.o.o.
Jure Kaštelana 19, 10 000 Zagreb, Hrvatska
Tel: +385 (0)1 2446 550, +385 (0) 1 2446 721,
E-Mail: info@hannainst.hr, sales@hannainst.hr
www.hannainst.hr

HRVATSKO DRUŠTVO KEMIJSKIH INŽENJERA I TEHNOLOGA

SVEUČILIŠTE U ZAGREBU
FAKULTET KEMIJSKOG INŽENJERSTVA I TEHNOLOGIJE

XIV. SUSRET MLADIH KEMIJSKIH INŽENJERA

KNJIGA SAŽETAKA

XIV MEETING OF YOUNG CHEMICAL ENGINEERS

BOOK OF ABSTRACTS

Zagreb, 24. i 25. veljače 2022.

Zagreb, 24th and 25th February 2022

Izdavač / *Published by*
Hrvatsko društvo kemijskih inženjera i tehnologa
Croatian Society of Chemical Engineers

Za izdavača / *For the publisher*
Tomislav Bolanča

Urednici / *Editors*
Krunoslav Žižek, Zvonimir Katančić, Marin Kovačić

Grafički urednik / *Graphical editor*
Zdenko Blažeković

Recenzenti / *Reviewers*
Filip Car
Igor Dejanović
Matea Gavran
Zvonimir Katančić
Marin Kovačić
Dajana Kučić Grgić
Domagoj Vrsaljko
Dragana Vuk
Krunoslav Žižek

Valerio Causin
Thomas Grützner
Cédric Guyon

Tekst pripremili / *Text prepared by*
AUTORI, koji su odgovorni za tekst sažetaka
AUTHORS, who are fully responsible for the abstracts

Priprema / *Layout*
Krunoslav Žižek, Zdenko Blažeković

ISSN 2718-2177

Organizatori / *Organizers*
Hrvatsko društvo kemijskih inženjera i tehnologa / *Croatian Society of Chemical Engineers*
Sveučilište u Zagrebu, Fakultet kemijskog inženjerstva i tehnologije / *University of Zagreb, Faculty of Chemical Engineering and Technology*

Pokrovitelji / *Under the Auspicies of the*
Ministarstvo znanosti i obrazovanja / *Ministry of Science and Education*
Sveučilište u Zagrebu / *University of Zagreb*
Akademija tehničkih znanosti Hrvatske / *Croatian Academy of Engineering*
Hrvatski inženjerski savez / *Croatian Engineering Association*

Znanstveno-organizacijski odbor / *Scientific and Organizing Committee*
Krunoslav Žižek, predsjednik / *Chair*
Kristina Sušac, organizacijski tajnik / *Secretarie*
Filip Car
Igor Dejanović
Matea Gavran
Zvonimir Katančić
Marin Kovačić
Dajana Kučić Grgić
Karla Plenča
Domagoj Vrsaljko
Dragana Vuk

Inozemni članovi / *International Members of the Committee*
Valerio Causin (ITA)
Thomas Grützner (GER)
Cédric Guyon (FRA)

Sponzori / *Sponsors*
HANNA Instruments d.o.o.
Fidelta d.o.o.
Mettler Toledo d.o.o.
Pliva Hrvatska d.o.o.
Siemens d.d.
Dechra – Genera d.d.
KEFO d.o.o.
MERCK d.o.o.
ROCKWOOL Adriatic d.o.o.
Shimadzu d.o.o.
Kontroltest International d.o.o.
XELLIA d.o.o.
ChemEngineering Journal MDPI izdavač / *publisher*
Agroproteinka d.d.
AlphaChrom d.o.o.
BIOVIT d.o.o.
Medic d.o.o.
RU-VE d.o.o.

Donatori / *Donators*
Franck d.d.
Kandit d.o.o.
KEMOLAB d.o.o.
Saponia d.d.

Mjesto održavanja / *Meeting Venue*
Sveučilište u Zagrebu, Fakultet kemijskog inženjerstva i tehnologije, Marulićev trg 19 & 20, HR-10 000 Zagreb /
University of Zagreb, Faculty of Chemical Engineering and Technology, Marulićev trg 19 & 20, HR-10 000 Zagreb

UVODNIK

Susret mladih kemijskih inženjera (SMLKI) je dugogodišnji projekt djelatnika Fakulteta kemijskog inženjerstva i tehnologije koji tradicionalno promiču kemijsko-inženjersku disciplinu i ističu važnost kontinuiranog razvoja kemijskog inženjerstva i kemije u Republici Hrvatskoj. Susret se tradicionalno održava svake dvije godine od 1996. u organizaciji Hrvatskog društva kemijskih inženjera i tehnologa i Fakulteta kemijskog inženjerstva i tehnologije Sveučilišta u Zagrebu, a ove godine po prvi puta postaje međunarodni skup. XIV. susret mladih kemijskih inženjera održava se 24. i 25. veljače 2022. godine na Fakultetu kemijskog inženjerstva i tehnologije u Zagrebu.

Ovaj znanstveno-stručni skup okuplja mlade znanstvenike koji će kroz sedam sekcija razmijeniti svoja iskustva i znanja stečena radom u industriji, na sveučilištima, institutima i drugim ustanovama te prezentirati rezultate svojih istraživanja u području kemijskog inženjerstva i kemije. Cilj susreta je afirmirati mlade stručnjake i struku predstavljanjem rezultata postignutih tijekom studija, izrade završnih, diplomskih i znanstveno-stručnih radova. Mladi znanstvenici razmijenit će nova dostignuća u području kemijskog inženjerstva i kemije, novim tehnikama i tehnologijama. Susret nastoji skrenuti pozornost na nužnost interdisciplinarnosti istraživanja, razvoja i provedbe proizvodnih procesa te ponuditi mogućnost otvorenog dijaloga između akademije i privrede.

Na ovogodišnji Susret prijavilo se 264 sudionika sa 193 rada. Tijekom dva radna dana održat će se 2 plenarna, 6 pozvanih, 23 sekcijska predavanja uz 162 posterska priopćenja i 6 izlaganja sponzora. Ove godine nagrađuju se najbolja posterska priopćenja i najbolje izlaganje u kategoriji sekcijskih predavanja, a cjeloviti radovi sa Susreta objavit će se u posebnom izdanju časopisa Kemija u industriji. Radovi će prije objavljivanja proći standardni postupak recenzije. Rok za slanje radova je 8. svibnja 2022.

Hvala svima koji su doprinijeli organizaciji XIV. susreta mladih kemijskih inženjera. Svim sudionicima želim uspješan rad i ugodno druženje!

Predsjednik Znanstveno-organizacijskog odbora
Izv. prof. dr. sc. Krunoslav Žižek

FOREWORD

The Meeting of Young Chemical Engineers (SMLKI) is a long-standing project of employees of the Faculty of Chemical Engineering and Technology, who traditionally promote the discipline of chemical engineering and demonstrate the importance for its continuous development in the Republic of Croatia. Organized by the Croatian Society of Chemical Engineers and the Faculty of Chemical Engineering and Technology, the Meeting has traditionally been held biennially since 1996 and this year, for the first time, it will be an international meeting. XIV Meeting of Young Chemical Engineers is held on February 24-25, 2022 at the Faculty of Chemical Engineering and Technology in Zagreb.

This scientific and professional meeting will gather young scientists who will share their experience and knowledge from industry, universities, research institutes and other institutions in its seven sections and present their research results in the field of chemical engineering and chemistry. The aim of the Meeting is to strengthen the young experts and our profession by presenting the results of their bachelor's and master's theses obtained during their studies. In addition, young scientists will share their valuable experiences and achievements in the field of chemical engineering and chemistry using new techniques and technologies. The Meeting seeks to focus on the essence of interdisciplinary research, development and enforcement of production processes and provide an opportunity for open dialog between science and industry.

This year's Meeting will gather 264 participants with 193 presentations. Two working days will feature 2 plenary lectures, 6 invited lectures, 23 section lectures with 162 poster presentations and 6 sponsor presentations. This year, prizes will be awarded for best poster presentations and the best oral presentation, while full papers from the Meeting will be considered for publication in the special issue of the journal Chemistry in Industry. Prior to publication, papers will undergo a standard peer review process. The deadline for submission of full manuscripts is May 8, 2022.

Many thanks to all who contributed to the organization of the XIV Meeting of Young Chemical Engineers. I wish all participants a successful and enjoyable conference!

Chair of the Scientific and Organizing Committee
Assoc. Prof. Krunoslav Žižek

SADRŽAJ
CONTENTS

PLENARNA PREDAVANJA / *PLENARY LECTURES*

POZVANA PREDAVANJA / *INVITED LECTURES*

USMENA IZLAGANJA / *ORAL PRESENTATIONS*

POSTERSKA IZLAGANJA / *POSTER PRESENTATIONS*

OPTIMIZATION OF HIGH VOLTAGE ELECTRIC DISCHARGE EKSTRACTION OF PHENOLICS FROM MANDARIN PEEL

Marija Banožić, Silvija Šafranko, Dora Bogadi, Stela Jokić

Josip Juraj Strossmayer University of Osijek, Faculty of Food Technology Osijek, Croatia
mbanozic@ptfos.hr

This study aimed to investigate the possibility of applying an high voltage electric discharge (HVED) extraction for the separation of phenolic compounds from the citrus peel (Mandarin, Okitsu variety). Mandarin peel represent citrus by-product generated during the growth and fresh fruit processing. In this study, the influence of three process parameters: time (5-15 min), frequency (40-100 Hz) and solvent/solid ratio (200-400 mL/g) on the extraction yield and bioactive compounds content in obtained extracts were investigated. The antiradical activity and the total phenolic content of the extracts were determined using spectrophotometric assays. The identification and quantification of individual phenolics were performed using high performance liquid chromatography with a diode array detector (HPLC-DAD). Based on the obtained experimental data, the extraction process was optimized using the Design Expert® software. Optimal parameters are defined as follows, for maximum extraction yield: solvent/solid ratio 285.93 mL/g, frequency 73.38 Hz and time of 14.84 min, for maximum hesperidin concentration: solvent/solid ratio 366.19 mL/g, frequency of 97.56 Hz and time of 5.10 min and for maximum narirutin concentration solvent/solid ratio 200 mL/g, frequency of 70 Hz and time of 15 min. The predicted data were experimentally confirmed with an error range of ± 10%. This study clarified that citrus by-products are valuable raw materials rich in phenoliccompounds. Also, using an innovative non-thermal extraction method with green solvent (water) it is possible to obtain satisfying content of bioactive compounds in citrus peel extracts.

This work has been supported by Croatian Science Foundation under the project "Application of innovative techniques of the extraction of bioactive components from by-products of plant origin" (UIP-2017-05-9909).