3rd International Conference on

AERoGELS FOR BIOMEDICAL AND ENVIRONMENTAL APPLICATIONS

BOOK OF ABSTRACTS

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University of Maribor Press

University of Maribor

Faculty of Chemistry and
Chemical Engineering

3rd International Conference on Aerogels for Biomedical and Environmental Applications

Book of Abstracts

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Gabrijela Horvat

August 2023

Title **3rd International Conference on Aerogels for Biomedical and Environmental Applications**

Subtitle **Book of Abstracts**

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Technical editor Jan Perša
(University of Maribor, University Press)

Cover designer Jan Perša
(University of Maribor, University Press)

Cover graphic Maribor`s Old bridge, foto Jure Kralj, visitmaribor.si, 2023

Conference name 3rd International Conference on
Aerogels for Biomedical and Environmental Applications

Conference date 5 – 7 July 2023

Conference location Maribor, Slovenia

Organizing committee Zoran Novak (Chair, University of Maribor, Slovenia), Carlos A. Garcia-Gonzalez (University of Santiago de Compostela, Spain), Gabrijela Horvat (University of Maribor, Slovenia), Amra Perva (University of Maribor, Slovenia), Milica Pantić (University of Maribor, Slovenia)

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Published by **University of Maribor**
University Press
Slomškov trg 15, 2000 Maribor, Slovenija
https://press.um.si, zalozba@um.si

Issued by **University of Maribor**
Faculty of Chemistry and Chemical Engineering
Smetanova ulica 17, 2000 Maribor, Slovenija
https://www.fkkt.um.si, fkkt@um.si

Edition 1st

Publication type E-book

Available at http://press.um.si/index.php/ump/catalog/book/796

Published at Maribor, Slovenia, August 2023

CIP - Kataložni zapis o publikaciji
Univerzitetna knjižnica Maribor

544.774.2:61(082)(0.034.2)

INTERNATIONAL Conference on Aerogels for Biomedical and Environmental Applications (3 ; 2023 ; Maribor)
3rd International Conference on Aerogels for Biomedical and Environmental Applications [Elektronski vir] : book of abstracts : [5–7 July 2023, Maribor, Slovenia] / editors Zoran Novak, Gabrijela Horvat. - 1st ed. - E-zbornik. - Maribor : University of Maribor, University Press, 2023

Način dostopa (URL): https://press.um.si/index.php/ump/catalog/book/796
ISBN 978-961-286-762-1 (PDF)
doi: 10.18690/um.fkkt.2.2023
COBISS.SI-ID 161163779

ISBN 978-961-286-762-1 (pdf)

DOI https://doi.org/10.18690/um.fkkt.2.2023

Price Free copy

For publisher Prof. Dr. Zdravko Kačič,
rector of University of Maribor

Attribution Novak, Z., Horvat, G. (eds.). (2023). *3rd International Conference on Aerogels for Biomedical and Environmental Applications: Book of Abstracts*. University of Maribor, University Press. doi: 10.18690/um.fkkt.2.2023

University of Maribor Press

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Z. Novak, G. Horvat (eds.)
University of Maribor Press

Supercritical CO_2 Extraction from Bilberry (Vaccinium myrtillus) Fruit and Impregnation of the Obtained Extract Onto Starch Aerogel

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Bilberries (*Vaccinium myrtillus*) have been used in traditional medicine to reduce inflammation and protect against diseases associated with oxidative stress, such as cardiovascular disease, diabetes, and age-related cognitive decline, as well as a remedy for eye conditions. The biological activity of bilberries is ascribed mainly to their high content of anthocyanins, but also to other valuable phytochemicals, including flavonols, phenolic acids, and tannins [1,2]. The enhanced stability and bioavailability of bioactive components from plant material could be accomplished by their incorporation into a polymeric carrier, using the promising integrated processes of supercritical fluid extraction (SFE) and supercritical solvent impregnation (SSI).

In the present study, starch aerogels were functionalized with bilberry fruit extract using the SFE-SSI process. The process conditions were optimized, based on the yield and chemical profile of the extracts and impregnated compounds, as well as the loading amount of extract in the aerogels. The starch aerogels were prepared as

previously reported [3] from an aqueous solution of cornstarch (1:10 w/v). After the replacement of water with acetone, by a successive increase of its concentration until 100%, the formed acetogel was subjected to drying using supercritical CO_2 ($scCO_2$) at 45 °C and 10 MPa. Aerogel was obtained, characterized by a high specific surface area of 208.6 m^2/g, porosity of 81.8% and 273 kg/m^3.

Initially, supercritical CO_2 ($scCO_2$) extraction was investigated as a method for isolating the extract from bilberry fruit at the temperature of 70 °C and pressures of 15 and 30 MPa, with and without the ethanol as a co-solvent. The obtained extraction yields ranged from 1.2 to 7%, with total phenolic content (TPC) values ranging from 250 to 380 mg GAE/g of the extract. The highest yield was obtained at a higher pressure of 30 MPa, while the addition of ethanol had a positive effect on the TPC. HPLC analysis revealed a high content of Procyanidin B1 in all the extracts.

The aerogel was impregnated further with bilberry fruit extract using the integrated SFE-SSI process. The influence of different parameters, including pressure, the addition of ethanol and plant material to the aerogel mass ratio was analyzed, resulting in impregnation yields around 32.4%. The presence of the extract on the surface of impregnated samples was confirmed by FTIR analysis (Figure 1).

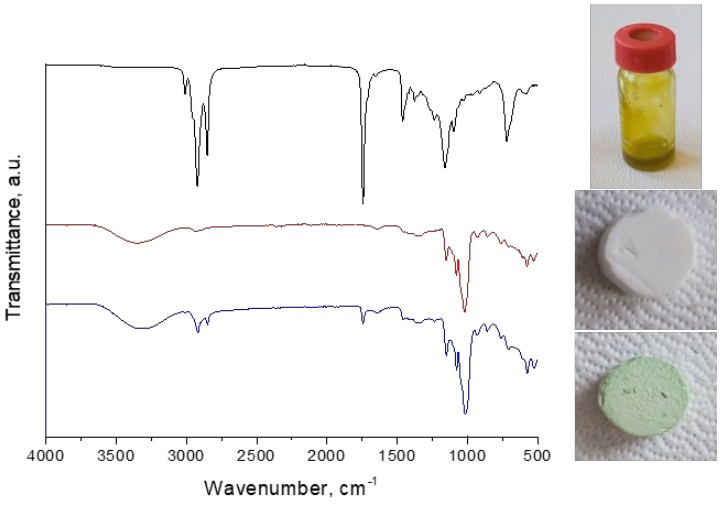

Figure 1: FTIR spectra of the extract and aerogel before and after impregnation
Source: own.

Acknowledgements

This work was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Contract No. 451-03-47/2023-01/200135) and EUREKA Programme (Network Projects ID E!13632). This publication is based upon work from COST Action "Advanced Engineering of aeroGels for Environment and Life Sciences" (AERoGELS, ref. CA18125), supported by COST (European Cooperation in Science and Technology).

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