
3rd International Conference on
**AERoGELS FOR BIOMEDICAL AND
ENVIRONMENTAL APPLICATIONS**



BOOK OF ABSTRACTS

Zoran
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Supercritical CO₂ 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 CO₂ (scCO₂) at 45 °C and 10 MPa. Aerogel was obtained, characterized by a high specific surface area of 208.6 m²/g, porosity of 81.8% and 273 kg/m³.

Initially, supercritical CO₂ (scCO₂) 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).

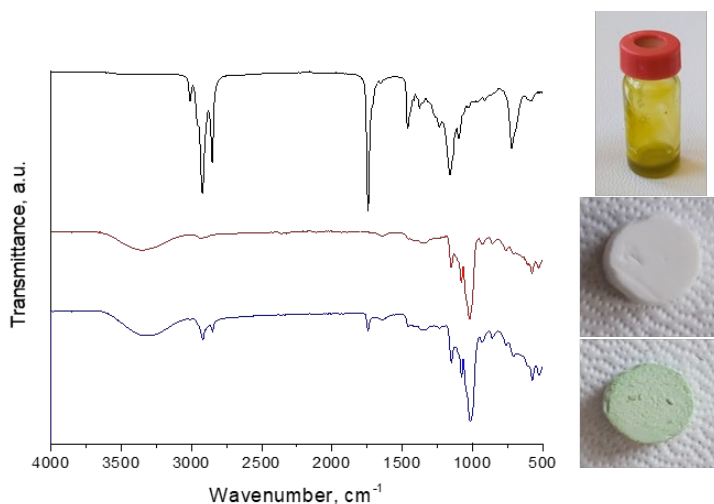


Figure 1: FTIR spectra of the extract and aerogel before and after impregnation

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