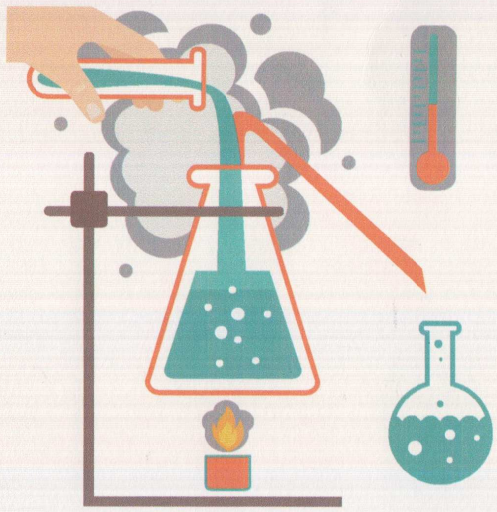
VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ
FAKULTA CHEMICKÁ

Studentská odborná konference
Chemie je život
21. listopadu 2019

Sborník abstraktů



Vysoké učení technické v Brně • Fakulta chemická

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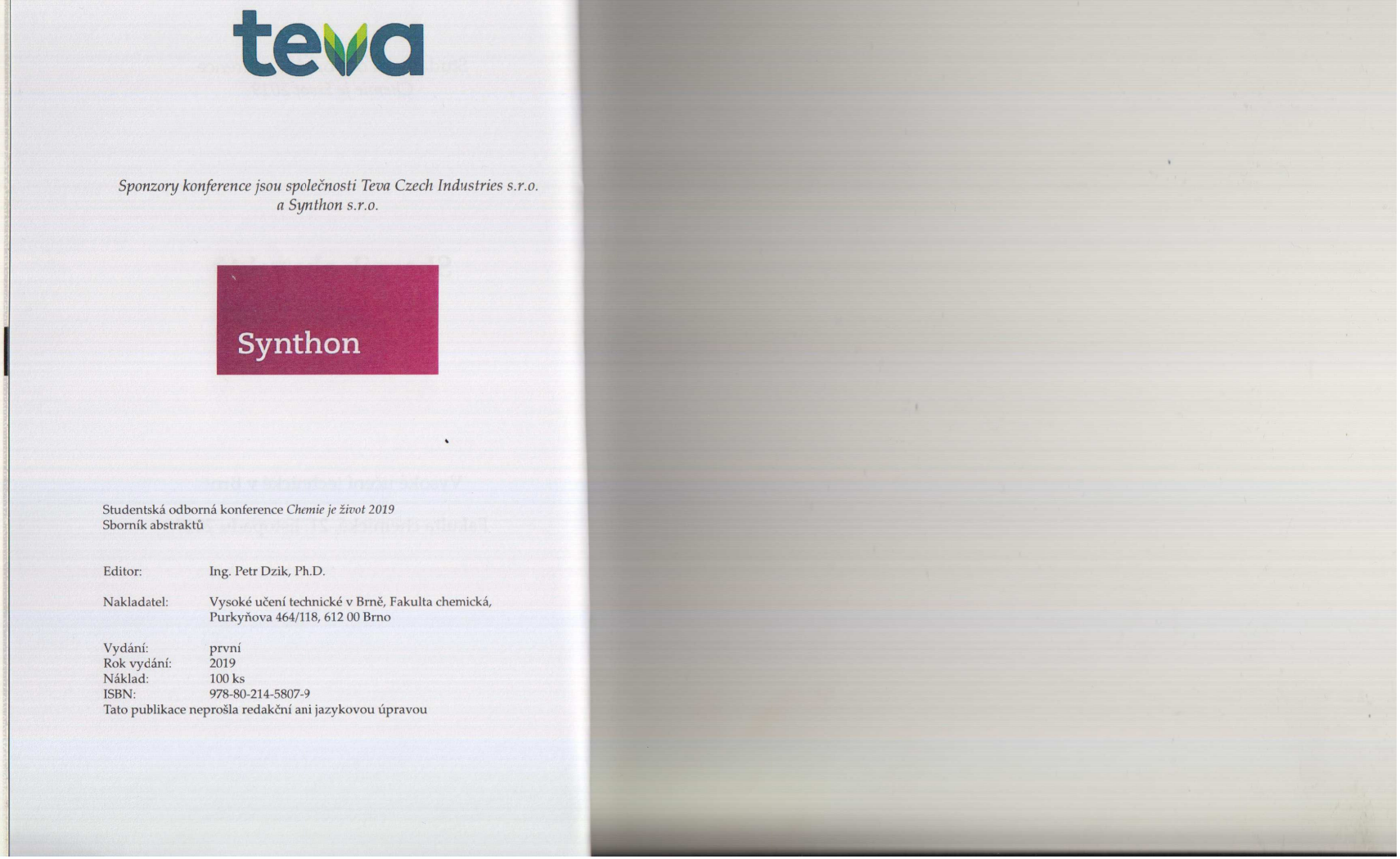

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Methodology for the optimization of LIBS analysis of soft tissues

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Biological tissues contain essential trace elements, which are known to have an important role in various metabolic processes taking place in the human body. In this work we focus on optimization of Laser-induced breakdown spectroscopy (LIBS) methods used for detection of these elements in soft tissues. Analysis of such samples using LIBS could be used for numerous biological applications in the future, such as utilization of listed trace metals as the potential biomarkers for cancer tissue diagnostics.

LIBS was applied to perform the elemental analysis of soft tissue samples – mouse kidneys. In order to get the optimum signal in the multi-element LIBS measurements of kidneys, the following experimental parameters: defocus, gas purge, atmosphere were adjusted, and signal to noise ratio response was studied. The process of optimization of experimental settings was described. Due to a different sample size and heterogeneity, a protocol of unification and mutual comparison was proposed.

Effect of carbon source on the microbial production of bacterial cellulose

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The worldwide production of wine in 2018 reached 292 million hectoliters. After the pressing of grapes for the wine production, grape pomace remains. Approximately 750 liters of wine and 260 kilograms of grape pomace is obtained from 1.3 tons of grapes. Grape pomace is a mixture of grape skins, seeds, and stems. The exact composition depends on the sort of grapes and the way of wine production. But pomace obtained from red or white wine production still contains a high concentration of sugar.

South Moravian region is known for its wine production so a relatively high mass of pomace could be available. Our research shows that the sugar extract from grape pomace could be used for the cultivation of Gluconacetobacter xylinus and the production of bacterial cellulose. This work shows an effect of pH, the type of cultivation (dynamic or static), and the kind of carbon source on the production of bacterial cellulose and its molecular weight.

Interestingly, the most effective carbon source was the grape pomace extract. The production of bacterial cellulose with 20 g/l of the sugar extract from the grape pomace was 13.5 g/l of bacterial cellulose. The reason is its composition (glucose, fructose, polyphenols, acids). The bacterial cellulose has unique properties compared to cellulose isolated from lignocellulosic materials such as high purity and mechanical strength. The use of bacterial cellulose is limited mainly to the medicine field because of its high price. However, also the applications in the food industry, textile industry, and electro-technique are known.

Our research is ongoing, and our nearest goal is to increase the production of the bacterial cellulose by using the fed-batch production and by optimizing the amount of dissolved oxygen in the medium.

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