

Project No DN 07/12 – 2016, financed by Bulgarian Fund for Scientific Research
Period of fulfilment two years (2017 – 2018)

Participating organizations:

Basic organization: Institute of Chemical Engineering, Bulgarian Academy of Sciences;

Partner organization: University of Chemical Technology and Metallurgy - Sofia

SUBJECT: Investigation of Ecologically Compatible Processes for Recovery and Fractionation of Valuable Functional Substances from Waste Biomass

ABSTRACT

The main aim of this interdisciplinary project is to establish experimentally and model fundamental relationships in extraction, fractionation and mixing of functional substances with different chemical structures and group chemical composition, with the view to create a modeling framework for design and optimization of the efficiency of mass transfer and the properties of the compounds. The relationships for exchange of matter between a solid and eco-compatible liquid and supercritical solvents will be studied at normal and high pressure on the generic example of the extraction of valuable functional substances from two model biomatrixes: dry marc residue from winemaking and spent coffee grounds. The concentrates, obtained after fractionation of the extracted substances (glycerides, polyphenols, terpenes, etc.) will be mixed in order to complement and enforce their functional activity, and the mixtures will be analyzed in order to access nonlinear relationships (synergism and antagonism) between their group chemical composition and their functional efficiency, e.g. their antioxidant capacity.

For the first time will be obtained experimental data which relate together the influence of the extraction parameters, the total yields and the yields, compositions and properties of the extracted functional substances, as well as data for the interactions affecting the antioxidant effect of their mixtures. A systematic approach for experimental optimization of the mass transfer will be developed along a modeling framework, applicable to any systems of the targeted type, thus providing fundamental elements for computer aided design of the processes, formulation of the composition and prediction of the antioxidation properties of additive functional bioextracts.

The realization of the proposed project will provide new knowledge in fundamental directions of the Bulgarian National strategy for scientific studies, namely in: energy, energy efficiency and transport; development of green and eco-technologies; health and quality of life and information technologies for chemical engineering processes.

Recent participation in scientific events for presentation of project results:

First International Conference on Bio-antioxidants (ICBA 2017) and Young Scientists School on Bio-antioxidants (YSSBA 2017), June 25-29, 2017, Sofia, Bulgaria

Presented reports:

“Evaluation of polyphenolic content and antioxidant capacity of spent coffee grounds”, S. Boyadzhieva, G. Angelov, S. Georgieva, D. Yankov, *Institute of chemical engineering, Bulgarian academy of sciences.*

“Green Extraction of Grape Seed Oil as a Potential Source of Antioxidants”, Jose Coelho ^{a,c*}, M. Paula Robalo ^{a,c}, Greta Naydenova^b, Dragomir Yankov^b, Roumiana Stateva^b, ^a *CIEQB, Instituto Superior de Engenharia de Lisboa, Portugal*, ^b *Institute of Chemical Engineering, Bulgarian Academy of Sciences, Bulgaria*, ^c *Centro de Química Estrutural, IST-UL, Lisboa, Portugal*

Conference scientifique avec participation internationale
“25eme anniversaire de la filiere francophone de Genie chimique et biochimique”,
Universite de technologie chimique et de metallurgie de Sofia, 27-29.09.2017, Sofia, Bulgaria

Presented reports:

“Green extraction of high added value substances from spent coffee grounds: preliminary results”, Sylvia Georgieva¹, Jose AP Coelho², M. Paula Robalo² and Roumiana P. Stateva¹, ¹*Institute of Chemical Engineering, Bulgarian Academy of Sciences, Bulgaria*, ²*CIEQB, Instituto Superior de Engenharia de Lisboa, Portugal.*

64th Scientific Conference with International Participation "Food Science, Engineering and Technology - 2017", October 20-21, 2017, UFT, Plovdiv, Bulgaria.

Presented reports:

“Study on the properties of the oils obtained from waste plant biomass”, Sylvia Georgieva¹, Jose Coelho², Roumiana Stateva¹, Stanislava Boyadzhieva¹, George Angelov¹, ¹ *Institute of Chemical Engineering, Bulgarian Academy of Sciences, Bulgaria*, ² *Higher Institute of Engineering of Lisbon, Lisbon, Portugal.*