OC-08

Engineered polymer particles for the valorization of phenolic compounds present in mixtures obtained through supercritical extraction

Catarina P. Gomes[a,*], Gayane Sadoyan[a], Rolando C.S. Dias[a], Mário Rui P.F.N. Costa[b]

[a]*LSRE - Instituto Politécnico de Bragança, Quinta de Santa Apolónia, 5300, Bragança, Portugal*
[b]*LSRE - Faculdade de Engenharia da Universidade do Porto, Rua Roberto Frias s/n, 4200-465, Porto, Portugal*

**cpgomes@ipb.pt*

Molecularly imprinted polymer (MIP) particles are here developed to target phenolic compounds present in mixtures resulting from supercritical extraction processes. Engineered MIP particles are synthetized considering different polymerization processes to tailor products morphology (e.g. precipitation or inverse-suspension polymerization to obtain micro-particles [1]) and also diverse functional monomers to explore preferential interactions with the template polyphenols (e.g. polydatin, resveratrol, etc). Moreover, MIP particles with surface grafted functional polymer chains (e.g. using RAFT polymerization [2,3]) are produced to assess the improvement of the selectivity of MIPs towards the target polyphenols, namely through the tuning of the hydrophilic/hydrophobic effects (amphiphilic materials are generated). The produced MIP particles are applied for the identification, separation and concentration of phenolic compounds present in vegetable extracts. Different plants abundant in the Trás-os-Montes and Alto Douro region (e.g. vineyard, chestnut tree, olive tree, cherry tree, etc) are considered as potential sources of phenolic compounds. Supercritical extraction with CO_2 is used to obtain the vegetable extracts (see Figure 1) and the effects of the operation conditions (temperature, pressure, vegetable used, etc) on extract composition is also assessed.
Molecular recognition capabilities of the MIPs synthetized towards the polyphenols are evidenced (e.g. packing the particles for chromatography) but hydrophilic/hydrophobic interactions are unavoidable and a solvent gradient is needed.

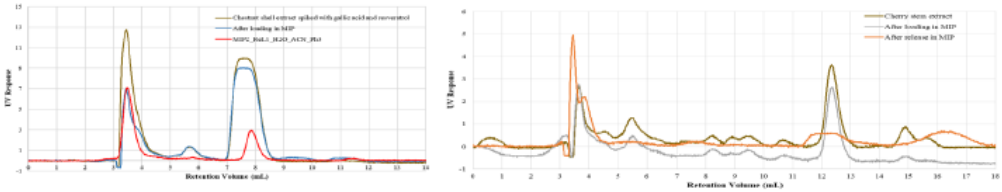

Figure 1. *HPLC analysis for chestnut shell and cherry stem SCCO2 extracts and correspondent upload/release fractions obtained with MIP particles.*

Acknowledgements:
This work is a result of project "AIProcMat@N2020 - Advanced Industrial Processes and Materials for a Sustainable Northern Region of Portugal 2020", with the reference NORTE-01-0145-FEDER-000006.

References:
[1] D. Oliveira, A. Freitas, P. Kadhirvel, R.C.S. Dias, M.R.P.F.N. Costa. Biochem. Eng. J. 2016, 111, 87–99.
[2] D. Oliveira, C.P. Gomes, R.C.S. Dias, M.R.P.F.N. Costa. React. Funct. Polym. 2016, 107, 35–45.
[3] H. Zhang. Eur. Polym. J. 2013, 49, 579–600.