

Department of Chemistry

Valorisation of agro-industrial streams

Biochemical and Process Engineering Group



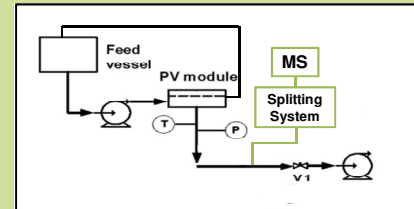
Carla Brazinha

(Pos Doctoral Fellow at FCT, since 2009)

- 2008, PhD in chemical Engineering
- 2008, Pos-Graduation in Enology
- 1997, Degree in Chemical Engineer, specialisation in Biotechnology

Objectives

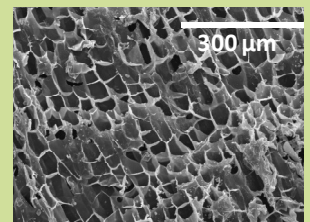
- Characterisation of dense films – the study of on-line transport properties of mixtures of gases, vapours and liquids through dense films
- Characterisation of natural cork and of other biological films. Preparation of blends with cork powder. Characterisation of composites based on cork powder
- Development of membrane pervaporation / vapour permeation processes - organic/organic separation (refinery applications) and organophilic (aroma recovery from fermentation media)
- Sustainable recovery / purification of biologically active compounds from natural matrices, specifically from food streams and food by-products



Pervaporation – Condensation system monitored by Mass Spectrometry: (1) recirculation pump; (2) vacuum pump; V1 valve.

Methodology

- Characterisation of the transport properties of dense films through on-line mass spectrometry (MS)
- In order to improve the economical viability of pervaporation / vapour permeation processes, the permeating vapours will be captured also using techniques that do not require the energy for phase transition, for example microencapsulation, possibly in supercritical CO₂ fluids
- Recovery / purification of bioactive compounds will be performed using pressure-driven membrane technologies. When a further enrichment is required, membrane processing may be integrated with supercritical CO₂ with different co-solvents or with chromatographic techniques.



SEM image showing the general aspect of a sample of natural cork

Expected Results

- Using on-line mass spectrometry monitoring, transient mass transport phenomena will be characterised, enabling a better understanding of transport mechanisms in membrane processes.
- The use of membrane processes in the recovery / purification of bioactive compounds is adequate for the sustainable production of natural extracts, as a result of the mild conditions of membrane processing, the final products can justify the label 'natural', which is essential for most food and cosmetic markets.



Grape pomace

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