Bioingegneria, biotecnologia e tecnologie per la salute
Bioengineering

DII research group
Chemical Bioengineering

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European project “Future Food”, Horizon 2020, Call H2020-SFS-2014-2.

European project “Processing Raw Materials into Excellent and Sustainable End Products while Remaining Fresh (PRESERF)” - SEVENTH FRAMEWORK PROGRAMME THEME KBBE-2009-2-2-03-Sustainable food and feed processing.

Research project "Supercritical decellularization of engineered tissues for clinical application" funded by Cassa di Risparmio di Trento e Rovereto (CaRiTRo), biomedical science section.

Consultant agreement “High pressure CO2 pasteurization of melon: feasibility study”, Committent: Sealed Air S.p.A

Main research topics:

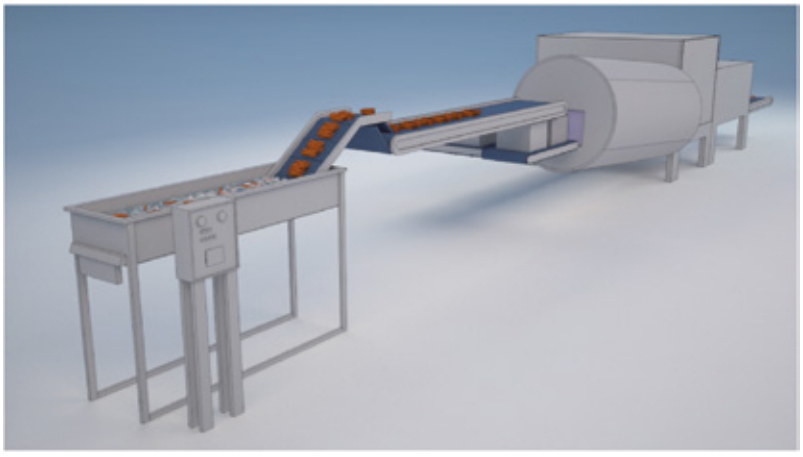
- Optimization of high pressure CO_2 process for low temperature food pasteurzation
- High pressure CO_2 process for food drying
- Batch and continuous pasteurization/drying of solid food products
- Investigation of CO_2 microbial inactivation mechanism
- In situ and on-line analysis of food quality under CO_2 pressure
- Microbial analysis of food products after pasteurization treatment
- Supercritical CO_2 drying of decellularized biological matrices

Supercritical CO_2 processes: new frontiers for the maintenance of food and natural biomaterials

In the Supercritical Lab we study the potential of supercritical CO_2 as alternative technology for the preservation of biodegradable materials. Pasteurization and drying are two of the most common techniques used in the food industry for the long term maintenance of food characteristics and safety in terms of microbial contents. Usually these techniques require high temperature conditions, which degrade physical-chemical characteristics, modify the sensorial aspects and deplete the nutritional contents of the treated products. Recently, our group has been investigating the potential of supercritical fluids, in particular CO_2, as a mean of bactericidal agent at supercritical state, both for liquid and solid foodstuffs. It has been proved that it induces microbial inactivation at low temperature (<40° C) showing great benefits for the maintenance of organoleptic properties and the nutritional content, without altering the physical and mechanical characteristics of the products. Additionally, supercritical CO_2 has been also applied as innovative technique for food drying, showing great potential for different fruits and vegetables.

Recently our group has been also involved in the conservation of natural scaffold for biomedical applications. The use of acellular matrices in tissue engineering has become extremely significant as tissue substitute for organ/tissue reconstruction. Nowadays these scaffolds must be used within few weeks from their preparation and they can’t be stored in advanced for patients with emergency needs. In this scenario we are investigating the effect of supercritical CO_2 drying as preservation techniques for decellularized scaffolds in order to create a process that will allow the long-term maintenance and banking of these scaffolds.

We are developing and set-up plants that allow the continuous recirculation of CO_2 at high pressure, with a direct effect in reducing timing and running costs, thus increasing the efficiency of these promising high pressure processes.



High pressure CO_2 pasteurization continuous plant for solid products