Biothermodynamics
Prof. Dr.-Ing. habil. Mirjana Minceva

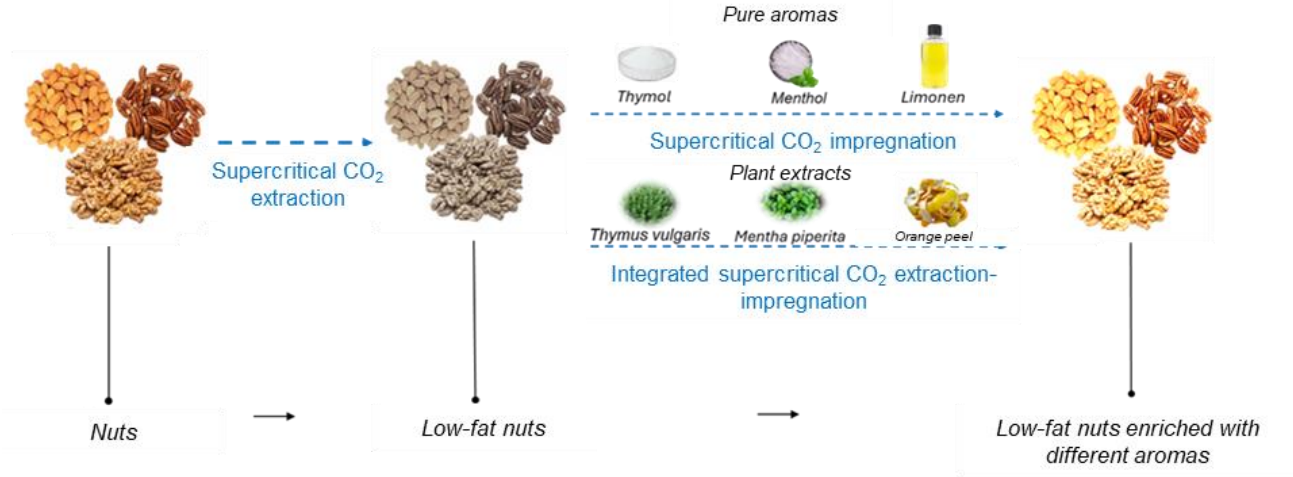
Master's Thesis

Development of Aroma-Enhanced, Low-Fat Nuts Using Supercritical CO_2 Technology

Growing consumer demand for healthier food products has led to increased interest in snacks with reduced fat content that retain desirable taste, texture, and aroma. At the same time, aromatic quality plays a crucial role in consumer acceptance. Nuts are a nutrient-rich food source, but their high fat content poses challenges in modern nutrition.

This thesis will investigate the application of environmentally friendly supercritical CO_2 ($scCO_2$) technology to produce low-fat nuts while enhancing their aroma profiles. The project involves supercritical CO_2 extraction (SCE) to selectively remove fats from nuts such as almonds, pecans, or walnuts, followed by supercritical CO_2 impregnation (SCI) of natural aroma compounds including thymol, limonene, and menthol. Both pure aromas and plant extracts (e.g., Thyme, or Mentha) will be tested.

The focus will be on optimizing process conditions, such as pressure, temperature, contact time, to maximize fat removal and aroma loading, while preserving the nut structure. The long-term aroma retention and textural properties of the treated nuts will also be evaluated.



Methods and devices:

- Supercritical fluid extraction
- Supercritical fluid impregnation
- Gas chromatography (GC)
- Texture and Porosity Analysis

Requirements:

The student should be highly motivated, organized, and able to work independently. Prior experience in SC-CO_2 technology and relevant analytical methods is not required.

Start: Immediately

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