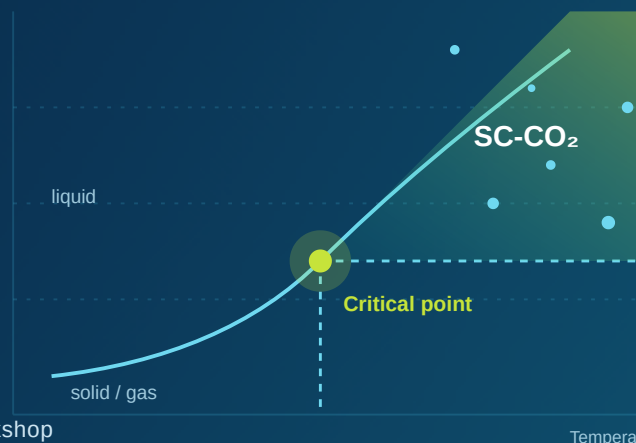


Supercritical CO₂ Technology for Clean & Sustainable Food Processing

Extraction · Particle Formation · Reactions

2026 Conference of Food Engineering | In-person · 3-hour workshop



Workshop scope

Supercritical fluid technology offers a versatile platform for developing cleaner, more selective, and more sustainable food processing operations. Supercritical carbon dioxide (SC-CO₂), the most widely used supercritical fluid in food applications, combines gas-like diffusivity with liquid-like solvent power, while its solvating properties can be tuned through pressure, temperature, and the use of co-solvents. Because CO₂ is nonflammable, readily available, and easily separated from processed materials, SC-CO₂ can reduce or eliminate conventional organic solvents and simplify downstream processing.

This workshop provides a practical understanding of the fundamentals, equipment, process design considerations, and emerging food applications of supercritical fluid technology, with emphasis on three major application areas:

1 · Extraction & fractionation

2 · Particle formation

3 · Reactions in supercritical media

Each topic is illustrated with food and ingredient case studies that connect fundamental principles with process performance, product quality, scale-up, and industrial implementation.

Learning outcomes

By the end of the workshop participants will be able to:

1. Explain phase behavior and the effects of pressure, temperature, density, flow rate, and co-solvents on solvent power, selectivity, mass transfer, and process performance.
2. Understand how clean biorefineries can be developed for various feedstocks using supercritical carbon dioxide, and understand process configurations for selective extraction, purification, and fractionation of food and agricultural materials.
3. Understand how supercritical fluids can be used to produce micro- and nanoparticles, encapsulate bioactive compounds, improve dispersibility, and enhance delivery and bioavailability.
4. Analyze case studies with attention to equipment configuration, product recovery, safety, economics, sustainability, and commercialization.

Target audience

Food engineers, food scientists, graduate students, researchers, equipment manufacturers, ingredient companies, and food-industry professionals interested in clean processing, ingredient recovery, particle engineering, reaction engineering, and sustainable food manufacturing.

Prerequisites

No prior experience with supercritical fluid technology is required. A general food science and engineering knowledge is sufficient.

Workshop format

An in-person, three-hour session combining expert lectures, case studies, a live demonstration, and interactive discussion and Q&A.

Lectures Fundamentals of supercritical fluid technology with emphasis on SC-CO₂: phase behavior, process parameters, mass transfer, and high-pressure equipment. Applications focus on clean biorefineries involving extraction, purification, and fractionation of food and agricultural materials, as well as supercritical-fluid-assisted particle formation and encapsulation.

Case studies Laboratory-, pilot-, and industrial-scale examples illustrating process configurations, product recovery, scale-up, safety, sustainability, economics, and commercialization.

Live demonstration Observe an extraction using a demonstration-scale SC-CO₂ extractor, including equipment setup, operating parameters, and product recovery.

Discussion & Q&A Concluding discussion of potential applications, technical challenges, and opportunities for scalable and sustainable implementation.

Instructor

Ozan Ciftci, Purdue University, USA

Costs

See website.

Questions

Email the instructor at ociftci@purdue.edu

Join us at CoFE '26 — hands-on fundamentals, real case studies, and a live SC-CO₂ extraction demonstration.