Complex phenomena occur during food processing because food is a multicomponent system. Engineering analysis as well as food science is inevitable for reasonably designing food manufacturing process and processing foods. Our goals are to quantitatively analyze and understand the phenomena occurring in various operations of food processing, to reasonably design the processes and to develop new processes.

Application of Subcritical Fluid to Food Processing

Water is one of the safe solvents which can be used for food processing. Water which maintains its liquid state even at temperatures higher than 100°C under a pressurized condition is called subcritical water. The subcritical water has two distinct features: one is low dielectric constant and another is high ion product. Organic solvents, such as ethanol, and their mixtures with water can be also held in subcritical state. Such fluids are called subcritical ones. Basic and application-oriented researches are conducted to apply the subcritical fluid to food processing.

Properties of Nano Emulsion

A nano-emulsion, composed of oil droplets less than 1 µm in diameter, has properties different from those of a micro-emulsion. For example, it looks transparent when the droplet size decreases. There is no accepted notion about whether the lipid oxidation is promoted or retarded in the nano-emulsion system. We aim to understand the phenomena occurring in the nano-world of food dispersion systems and the role of the interface between dispersed and continuous phases, which is of growing interesting around the world.

Drying and Rehydration of Foods

Many food materials such as pasta are dried to improve their shelf life and eaten after rehydration. During the processes, complicated phenomena such as glass transition and gelatinization of starch occur. We analyze phenomena occurring during the drying and rehydration processes of the materials containing many components and with complicated structure from engineering aspect in cereal science.

Liquid Chromatographic Separation

A chromatographic separation of saccharides using cation-exchange resin is a traditional separation process. However, our knowledge seems to be insufficient for reasonably designing the separation process. So, we investigate adsorption isotherm and rate processes from the viewpoints of physical chemistry and separation engineering.
Keywords

Subcritical fluid, nanoemulsion, dispersion science, food engineering, food physical chemistry, chemical reaction engineering

Recent Publications

Kinetic analysis of lactulose production from lactose in subcritical aqueous ethanol.
Food Sci Technol Res 23: 45-49

Decomposition kinetics of glucose and fructose in subcritical water containing sodium chloride.
J Appl Glycosci 63: 99-104

Kinetics of the disappearance of N-acetyl-D-glucosamine in subcritical aqueous ethanol.
Japan J Food Eng 17: 99-104

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Japan J Food Eng 17: 91-94

Water sorption kinetics of gluten-added wheat noodle.
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Antioxidative properties of stearoyl ascorbate in a food matrix system.
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Preparation of liquid and solid seasonings with shrimp-like flavor from isada krill under subcritical water conditions by steam injection.

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Japan J Food Eng 16: 231-234
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