

Food Technology and Engineering

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All faculty members of the department are active in several areas of research that are of importance to the Thai food industry. These include thermal processing and drying of foods and biomaterials, food properties characterization, food safety and microbiology, biotechnology as well as food nanotechnology. Both theoretical and experimental approaches are used to tackle various kinds of problems that are both fundamental and applied in nature.

The research of the department has been well supported by government funding agencies (e.g., TRF, CHE, BIOTEC, NRCT and IFS) and industry through research partnerships and contracts. The results of our

research are published widely in top-quality international journals. solving and collaboration with major food and drug manufacturers (e.g., Saha Farm Group, Ampol Food, Sam Roy Yod, Biolab, etc.) More than 50 food innovations and patents, our competent researchers have boosted Thailand's food processing revenue several billion bath annually.

Research Areas

Thermal Processing

Thermal processing is one of the prominent research areas of the department. The focus is on development and study of the use of novel thermal processing technologies, e.g., and application of ohmic heating to food industry, as well as on industrial problem related to thermal processes, Combined method or hurdle technology is also employed to improve the product quality. Application of image analysis for color determination of solid foods is another topic of interest. Specific areas of applications include

Drying

Drying is one of the strongest research areas of the department. The focus is on development and study of the use of novel drying technologies, e.g., low-pressure superheated steam drying (LPSSD) and microwave vacuum drying (MVD), as well as more conventional technologies, e.g., spray drying, to produce value-added foods as well as advanced and/or functional biomaterials.

Food Properties Characterization

Research involves concept in physical and engineering properties of food and biomaterials, i.e., physical characteristics, surface, functional, phase transition, mechanical, thermal, electrical and optical properties.

Food Safety and Microbiology

Food safety is one of the most important issues when dealing with food processing. The topics of interest include chemical hazards in fresh and processed fruits and vegetables and microbial decontamination of fruits and vegetables.

Kinetics in Food Processing

During food processing and storage, chemical, physical and microbial reactions cause various changes in food quality. Kinetics can be used as a valuable tool to describe, predict and optimize these quality changes.

Food Nanotechnology

The current nanotechnology research interests within the Department are electrospinning of biomaterials, which include fabrication of novel biomaterials for in vivo controlled release

applications as well as novel approach to electrospinning of biopolymers. Attention has also been on the study of controlled release for other more general food applications.

Novel Food Processing Technologies

Thailand has been dubbed as “the kitchen of the world” since our food products are distributed and consumed in every corner of the world. Our food export figures and food production capacity are advancing continuously in recent years. However, the industry still utilizes obsolete technologies characterized by long processing time, labor intensiveness, excessive energy consumption, and high cost per unit of production. This research group is established to tackle food processing inefficiency and emphasizes on revolutionizing and reinventing conventional industrial food technologies. We have a long history of industrial problem

Achievements :

Development of small-scale pasteurizer for thermal treatment of acidified bamboo shoot in rectangular cans as well as in laminated pouches

Inhibition of browning of pineapple chunk in light syrup packed in retortable carton

Development of an image analysis technique for monitoring browning development during chicken roasting

Production of health snacks via the use of low pressure superheated steam drying

Control of pathogenic bacteria contaminated in dried food by superheated steam drying

Characterization of food surface topographical features during processing by image analysis technique

Electrodialysis desalination of fish sauce

Design and development of mango sorter with machine vision system (Patent No. 22004)

Fabrication of nanostructures from biomaterials for bioactive compound controlled release applications

Novel salted yolk brining process. This new brining process was able to shorten curing time from 14-21 days to merely 6 hours enabling replacement of duck eggs by chicken eggs for better GMP and HACCP implementation.

Selected Publications

Kanjanapongkul, K., Tia, S., Wongsangasri, P., and Yoovidhya, T., 2009. Coagulation of protein in surimi wastewater using a continuous ohmic heater. *Journal of Food Engineering*, 91, 341-346.

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Chindapan, N., Devahastin, S., Chiewchan, N., 2009. Electrodialysis desalination of fish sauce: Electrodialysis performance and product quality. *Journal of Food Science*, 74, Nr.7.

Hawaree, N., Chiewchan, N., Devahastin, S. 2009. Effect of acetic acid pretreatment and hot air drying on resistance of *Salmonella* on cabbage slices. *Drying Technology*, 27, 955-961.

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Morakotjinda, P., Chiewchan, N. 2009. Effect of pretreatment and drying on composition and bitterness of high-dietary-fiber powder from lime residues. *Drying Technology*, 27, 133-142.

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Tanongkankit, Y., Chiewchan, N., Devahastin, S. 2010. Effect of processing on antioxidants and their activity in dietary fiber powder from cabbage outer leaves. *Drying Technology*, 28, 1063-1071.

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Thakhiew, W., Devahastin, S., Soponronnarit, S. 2010. Effects of drying methods and plasticizer concentration on some physical and mechanical properties of edible chitosan films. **Journal of Food Engineering**, 99, 216-224.

Wongsasulak, S., Patapeejumruswong M., Weiss J., Supaphol P. and Yoovidhya T. 2010. "[Electrospinning of food-grade nanofibers from cellulose acetate and egg albumen blends](#)" **Journal of Food Engineering**, 98(3), 370-376.

Wongsasulak* S., Tongsin, P., Intasanta, N., Yoovidhya T. 2010. Effect of glycerol on solution properties governing morphology, glass transition temperature and tensile properties of electrospun zein film. **Journal of Applied Polymer Science**, 118, 910-919.

Kanjanapongkul, K., Wongsasulak, S., Yoovidhya, T. 2010. Investigation and prevention of clogging during electrospinning of zein solution. **Journal of Applied Polymer Science**, 118, 1821-1829.

Kanjanapongkul, K., Wongsasulak, S., Yoovidhya, T. 2010. [Prediction of clogging time during electrospinning of zein solution: scaling analysis and experimental verification](#). **Chemical Engineering Science**, 65, 5217-5225.

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