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Drying Technology Laboratory

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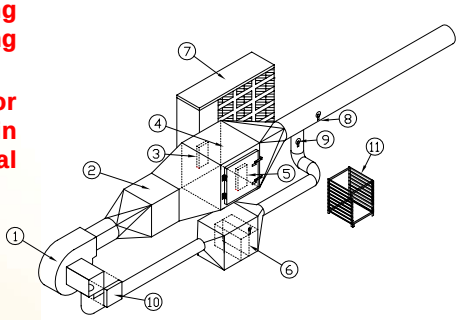
Our research projects are related with the advanced drying technologies for food and biomaterials. The main objectives of these research projects are to improve the product quality and to produce new products. Design of efficient drying conditions can improve the product quality as well as reduce the energy consumption. Therefore, the effects of drying methods, drying mediums, drying temperatures and pretreatments before drying are studied.

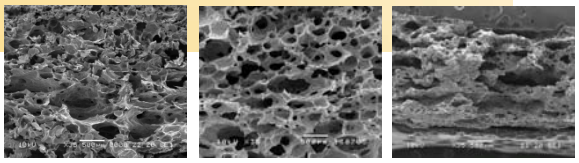
In addition, the mathematical models are useful tools for pre-design that can reduce the trial and error efforts involved in experimentation. Therefore, the development of mathematical models has been studied for our projects.

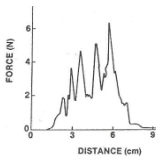


Research Projects

Fruit Drying

Because of the increasing consumer demand for snack foods, fruits, e.g., banana and durian have the potential to commercially produce snacks at a small scale industry. Banana and durian chips can be produced by various conventional methods, e.g., frying and hot air drying. However, banana and durian chips obtained by frying method have a short shelf life due to lipid oxidation leading to ran acidity. To alleviate the remaining vegetable oil inside these products, drying has been used instead. In this project, the combination of foam formation and hot air drying is proposed to produce banana chips. In addition, the high temperature short time or puffing method will be proposed to produce durian chips. The mathematical model has also been developed to describe the moisture transfer in banana and durian chips. The qualities of the final products in terms of shrinkage, texture and microstructure have been evaluated.





Herb Drying

Thai herbs, e.g., garlic and ginger have been used not only as a food but also as a medicine. The garlic is our focus. The sulphur compounds of garlic, primarily allicin and its by-product play an important role in medicinal effects such as antimicrobial, antioxidant and anticancer activities, as well as ability to lower cholesterol and blood lipid levels. To prevent the typical loss of allicin, some manufacturers have attempted to stabilize alliin and allinase so that these compounds must remain separated prior to consumption in order to produce allicin inside the body. However, allicin was not found in the blood after consumption because allicin changed into diallyl sulfide. Diallyl disulfide exhibits ability to lower cholesterol and blood lipid levels. The objectives of this project are therefore to produce garlic powder with high diallyl disulfide by drying sliced and chopped garlic using heat pump and combined far infrared-heat pump drying, comparing with hot air drying. The effects of drying temperature, radiation intensity, sample preparation and type of garlic on the drying characteristics and the qualities of the final products in terms of diallyl disulfide, volatile oil content, pyruvic acid and color will subsequently be evaluated.

Publications

- **Thuwapanichayanan, R., Prachayawarakorn, S. and Soponronnarit S., 2008, "Drying Characteristics and Quality of Banana Foam Mat", *Journal of Food Engineering*, Vol 86, Issue 4, pp. 573-583.**
- **Thuwapanichayanan, R., Prachayawarakorn, S. and Soponronnarit S., 2008, "Modeling of Diffusion with Shrinkage and Quality Investigation of Banana Foam Mat Drying", *Drying Technology*, Vol 26, Issue 11, pp. 1326-1333.**