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## Innovative applications of infrared heating for food processing

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Infrared (IR) radiation heating has been considered as an alternative method for food and agricultural processing to improve product quality and safety, increase energy and processing efficiency and reduce water and chemical usage. Several novel IR-based technologies have been developed recently by taking advantage of high heat transfer rate of IR radiation for blanching, dehydration and peeling of fruits and vegetables; production of healthy French fries; roasting and pasteurization of almonds and drying, disinfestation and enzyme inactivation of rice. It was found that IR heating achieved simultaneous blanching and dehydration eliminated the need for water or steam for blanching and reduced processing time and energy use. When it is applied to French fry production, the oil content in finished product and frying time were significantly reduced. The Sequential IR and Freeze-Drying (SIRFD) method produced crispy strawberry pieces with a 40 percent reduction of freeze drying time. As a sustainable peeling method without using chemicals and steam, IR dry-peeling produced high quality peeled fruits and vegetables with reduced peeling loss. The Sequential IR and Hot Air (SIRHA) method produced high quality dry-roasted almonds while ensuring pasteurization and significantly reducing roasting time compared to the current hot air roasting method. When IR is used for pasteurizing raw almonds, the treatment retains the characteristics of the raw commodity. IR heating also achieved simultaneous drying, disinfestation and partial enzyme inactivation of rough rice. The development and commercialization of IR-based food processing technologies should open new avenues to delivering safe and value-added foods desirable to consumers while reducing the consumption of natural resources during processing.

### Biography

Zhongli Pan is a Research Engineer at the Western Regional Research Center, Agricultural Research Service, United States Department of Agriculture, and Adjunct Professor in the Department of Biological and Agricultural Engineering (BAE), and Director of World Food Center – China at University of California (UC), Davis. He received his PhD degree in Food Engineering from the Department of BAE, UCDavis, in 1998. He had outstanding work experience in academia, research institutions and industry. His current research focuses on the development of new and improved processing technologies for food and agricultural products. He authored more than 250 scientific publications, patents, books and book chapters.

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