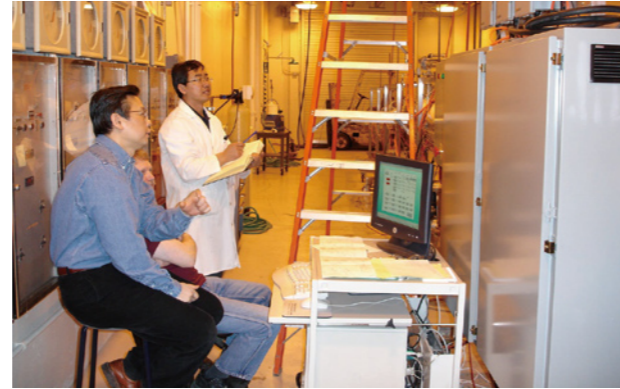


US FDA approved first microwave sterilization process developed by Washington State University

General

A revolutionary thermal processing technology using 915 MHz microwave energy has been approved by US Food and Drug Administration (FDA). Professor Juming Tang, in the Department of Biological Systems Engineering, Washington State University (WSU), led a team of university, industry and U.S. military scientists to develop the new technology. The outcome results in food with a longer shelf life as well as better flavor and nutritional value compared to more traditional food-processing methods such as canning. This is the first time that the FDA has approved the use of microwave energy for producing pre-packaged, low-acid foods— in what Prof Tang described as “a major milestone that clears the way for its commercialization”. Five representatives of the Washington State University Microwave Sterilization Consortium, Juming Tang, project lead, Washington State University; C. Patrick Dunne, US Army Natick Soldier Research Development and Engineering Center; Douglas Hahn from Hormel Foods Corporation; Kenny Lum from Seafood Products Association; and Evan Turek from Kraft Foods, received the 2010 IFT Research and Development Award for their contributions to food technology that result in improved public health through nutrition or more nutritious food. The consortium also includes Ferrite Component, Rexam Containers, Graphic Packaging and Ocean Beauty Seafood.

Spearheaded by C. Patrick Dunne, Department of Defense combat feeding directorate at the U.S. Army Soldier Systems Center at Natick, Mass., the project has been funded from a variety of sources and a consortium of industry members that consists of major US food processing,



packaging and microwave equipment companies, including Kraft Foods, Hormel, Ocean Beauty Seafoods, Rexam Containers, Ferrite Components and Graphic Packaging. The WSU team also worked closely with process authorities of the Seafood Products Association in Seattle and Hormel to establish validation procedures and in preparation of filing documents. In addition, faculty members from other WSU departments, particularly Food Science, contributed to the project. “The team’s collective efforts have brought a new food processing technology to the forefront that will truly benefit not only the commercial sector but our war-fighters worldwide with a wider variety of high quality, shelf-stable foods,” said Gerald Darsch, director of the U.S. Department of Defense Combat Feeding team. “It is truly a tremendous accomplishment.”

Technology

Since the introduction to industrial microwave ovens in the late 1940s, the food industry and US Army have shown strong interest in exploiting the rapid heating capability of microwaves to improve the quality of canned food. The technical issue has always been ensuring uniform and reproducible heat treatment.

The technology immerses packaged food in pressurized hot water while simultaneously heating it with microwaves at a frequency of 915 MHz — a frequency which penetrates food more deeply than the 2450 MHz used in home microwave ovens. This combination eliminates food pathogens and spoilage microorganisms in just



five to eight minutes and produces safe foods with much higher quality than conventionally processed ready-to-eat products. It is a heat process, which does not create any chemicals or any residues that are harmful to humans. The new processes for producing shelf-stable, low-acid foods must pass rigorous reviews by FDA to ensure that the technology is scientifically sound and the products will be safe.

The breakthrough came through the development of a new chemical marker system to identify a food’s cold spot and ensure this was heated to somewhere between 250F and 270F. Other challenges the team overcame were providing microbial validation that the product has been sterilized.

Conventional canned foods typically spend an hour or two in an industrial pressure cooker. That changes product taste, usually not for the better. Using Professor Juming Tang’s alternative process it takes just eight minutes. Essentially, it combines the pressure cooker with microwave energy.

The microwave sterilization process has been developed over a 13-year period by WSU professor Juming Tang and a team of university, industry and US military scientists. Prof Tang’s team patented system designs in October 2006 after more than 10 years of research. They spent another three years, developing a semi-continuous system, collecting engineering data and microbiologically validating the process before receiving FDA acceptance.

The FDA initially approved the process for mashed potatoes. In the meantime, the WSU team led by Professor Tang continues to optimize the design and prepare FDA authorization for additional food products. Future applications could include chicken breast, dumplings, and salmon fillets in shelf-stable plastic trays. The system also has huge potential to be developed as a pasteurization tool

for such items as chilled or frozen meals.

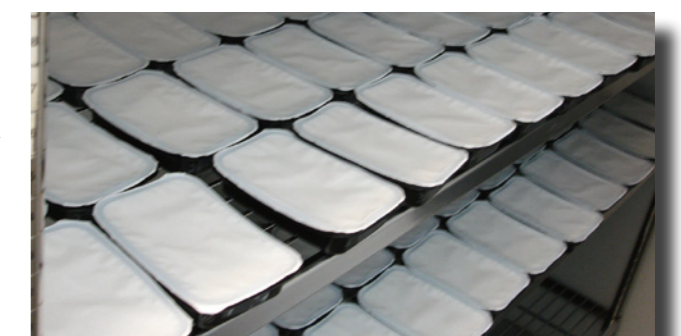
Commercialization

The new technology has already attracted the attention of the US military, a host of major food companies and could be used to preserve food for frontline soldiers and astronauts on deep space missions, said the team. Scientists involved in the project believe it could revolutionize how food is preserved and processed. It could have major implications for the food industry.

Professor Tang said the system could reach the market in as little as two years. He mentioned work was ongoing to scale up the technology from its present throughput of around 50 trays or pouches per minute to provide the type of processing volumes that larger food companies would require. A start up company has already been set up to push ahead with commercializing the system and a number of the largest food companies have shown interest.

The FDA has approved the alternative to the traditional canning process. Therefore, in next few years, you can look forward to a greater variety of prepared foods that do not need refrigeration at the grocery stores.

Prof Tang has taught food engineering at WSU since 1995, following similar academic duties at South Dakota State University and Canada’s Acadia University. Since 2001, he has served as director of the Microwave Sterilization Research and Development Consortium, which includes Kraft, Hormel, Rexam Containers and the US Department of Defense. Tang earned an undergraduate degree in mechanical engineering at Central-South University of Technology in Hunan, China, before studying in Canada, receiving a Master’s Degree at University of Guelph and a PhD in agricultural engineering at the University of Saskatchewan. He is the President of International Microwave Institute and a 2004 Summer Fellow of NASA Food Center in Houston.



Contact means

Dr. Juming Tang

Professor Scientist
Biological Systems Engineering
Washington State University
L. J. Smith 204 P.O. Box 64120
Pullman Washington 99164 6120
TEL: 509 335 2140
FAX: 509 335 2722
Email: jtang@wsu.edu
<http://www.bsye.wsu.edu/tang>

