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Ultrasonic energy in food technology: Novel applications and devices

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The application of power ultrasound to food processing constitutes an emerging and promising alternative or complement to conventional technologies due to special features and sustainable character of ultrasonic energy. High-intensity ultrasound as a mechanical non-contaminant non-ionizing radiation plays an important role in the search for safer and higher quality products. The Power Ultrasonics Group of the CSIC and PUSONICS SL has worked together towards introducing novel systems and methods for food processing. Airborne ultrasonic devices have been investigated and developed for gas and multiphase fluid treatments. Specific applications studied are defoaming, drying and supercritical fluid extraction. Foam is generally an unwanted by-product in food processes. Chemical anti-foaming agents are used but contaminate products. Ultrasonic energy constitutes a clean and efficient procedure to break foam. Drying is used for preserving food. Conventional procedures are hot-air drying and freeze-drying. Hot air drying can produce deteriorative changes in food. Instead, in freeze-drying the product quality is maintained but is expensive. Ultrasound is effective in dewatering food maintaining quality. Moreover, ultrasound has a great potential to intensify low temperature drying. Supercritical fluid extraction is attracting wide interest but has slow dynamics. Tests carried out for oils extractions showed that ultrasound accelerates mass transfer significantly enhancing product yield. Homogenization, mixing, emulsification and degassing of liquids by ultrasound have also been investigated. These studies lead to the development of efficient ultrasonic systems for liquid processing.

Biography

Juan A Gallego-Juárez is a Professor to the honor at the Spanish Higher Council for Scientific Research (CSIC) where he founded the group of Ultrasonics and has been the Director of the Institute of Acoustics and of the Center for Physics Technologies. He is also Principal Scientific Adviser at the company PUSONICS S.L. His research work has always been related to power ultrasonics and their applications specifically in food and environmental processes. He is the author of over 300 publications and 40 patents and is co-editor of the recently published book "*Power Ultrasonics*" (Woodhead Publishing-Elsevier 2015).

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