Ultrasonic Cavitation Monitoring By Acoustic Noise Power

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Ultrasonic Cavitation Monitoring By Acoustic
In this paper, a new tool is proposed to carry out acoustic cavitation monitoring and to have an overview of its effects in applications. After a brief review of the cavitation characterization...

(PDF) Ultrasonic Cavitation Monitoring by Acoustic Noise ...
In this paper, a new tool is proposed to carry out acoustic cavitation monitoring and to have an overview of its effects in applications. After a brief review of the cavitation characterization techniques, it is shown that cavitation noise is a suitable and accurate indicator of the cavitation activity induced in a liquid. In the first part of this study, the origin of the first spectral component of the cavitation noise is discussed.

Ultrasonic cavitation monitoring by acoustic noise power ...
The f/2 and 2 f component evolution measurement at a driving frequency around 1 MHz confirms Neppiras' ones and gives an indicator of the cavitation inception. In the second part, the cavitation noise spectrum distortion is considered as a function of the acoustic power transmitted to the liquid in order to obtain an indicator of cavitation activity.

Ultrasonic cavitation monitoring by acoustic noise power ...
Ultrasonic cavitation is effective to disperse micro/nanoparticles. However, works on correlating the cavitation parameters with the micro/nanoparticle dispersion are limited. This paper presents a real-time acoustic monitoring method based on cavitation noises to monitor the micro/nanoparticle dispersion status.

Acoustic Emission Monitoring for Ultrasonic Cavitation ...
Ultrasonic cavitation monitoring by acoustic noise power measurement J. Frohly,a) S. Labouret, C. Bruneel, I. Looten-Baquet, and R. Torguet Institut d Electronique et de Microe ´lectronique du ...

Ultrasonic cavitation monitoring by acoustic noise power ...
itself. These acoustic emissions are analyzed in the ultrasonic frequency range, and a characteristic value is derived that can clearly assign the turbine s cavitation state to one of four cate-gories: no cavitation, incipient cavitation, slight (admissible) cavitation or strong cavitation. The monitoring system consists of a set of 8152C acoustic emission

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Cavitation monitoring in water turbines using acoustic ...
Role of acoustic cavitation in the delivery and monitoring of cancer treatment by high-intensity focused ultrasound (HIFU) C. C. COUSSIOS1, C. H. FARNY2, G. TER HAAR3, & R. A. ROY2 1Institute of Biomedical Engineering, Department of Engineering Science, University of Oxford, Oxford, UK,

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Role of acoustic cavitation in the delivery and monitoring ...
A new method for separate identification and determination of the spatial distribution of the two components of the energy intensity in an ultrasound bath (due to the ultrasound waves and cavitation activity) uses two media cavitating (water) and noncavitating (silicon oil) under the conditions of the acoustic field in the ultrasound bath.

Mapping the cavitation intensity in an ultrasonic bath ...
The used analysis method is based on acoustic emissions acquired by a piezo electric broad band sensor over one or more machine revolutions. It is based on the ultrasonic acoustic emissions above frequencies of 100 kHz. The time signals of the acoustic emissions sensor during cavitation are characterized by sharp bursts.

Cavitation Monitoring in Hydraulic Turbines
Acoustic power is more difficult to measure because of the power by demand characteristics of most ultrasonic systems. This means that the rated power of the generator cannot be used as an indication of acoustic power, since the power transferred will depend upon: (a) how heavily the transducer is loaded (this is a function of horn magnification); and (b) the area of the horn immersed in the ...

Power Ultrasonic equipment practice and application ...
Acoustic cavitation has been shown to play a key role in a wide array of novel therapeutic ultrasound applications. This paper presents a brief discussion of the physics of thermally relevant acoustic cavitation in the context of high-intensity focussed ultrasound (HIFU).

Role of acoustic cavitation in the delivery and monitoring ...
The application of acoustic emission to non-destructive testing of materials typically takes place between 100 kHz and 1 MHz. Unlike conventional ultrasonic testing, AE tools are designed for monitoring acoustic emissions produced by the material during failure or stress, and not on the material's effect on externally generated waves.

Acoustic emission - Wikipedia
Coltraco s acoustic based monitoring tool is the first of its type in the world, the pocket size Portamonitor includes a powerful ultrasonic monitoring technique to test bearings and rotating machinery and is suitable for a number of industries including ships and vessels.

Acoustic Emissions & Acoustic Condition Monitoring ...
1. J Magn Reson Imaging. 2020 Jan;51(1):311-318. doi: 10.1002/jmri.26801. Epub 2019 May 24. Monitoring of acoustic cavitation in microbubble-presented focused ultrasound exposure using gradient-echo MRI.

Monitoring of acoustic cavitation in microbubble-presented ...
The bioeffects normally associated with ultrasound exposure are caused by heat, mechanical effects, and acoustic cavitation. Among these special effects, acoustic cavitation is believed to be the most important one. 3 It has been experimentally shown that bubble collapse creates severe conditions for an extremely short period with temperatures of 2000°K to 5000°K and pressures up to 1800 atm at the collapsing cavity.

Therapeutic Effects of Acoustic Cavitation in the Presence ...
The model is verified via acoustic detection of cavitation activity, resolved by high-speed shadowgraphic imaging, in close proximity to the tip of a PVdF needle hydrophone calibrated for phase and magnitude from 125 kHz to 20 MHz.

An analysis of the acoustic cavitation noise spectrum: The ...
izing acoustic cavitation occurring within ultrasonic clean ing vessels, the throughoutsensor passively monitors broadband acous tic emissions generated by bubbles withinundergoing acoustic cavitation, and it associates the measured signals to with a specific region of space. The objective of the current pa

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A Novel Sensor for Monitoring Acoustic Cavitation. Part I ...
Gadolinium based contrast agents can be used to identify the blood brain barrier (BBB) opening after inducing a focused ultrasound (FUS) cavitation effect in the presence of microbubbles. However, the use of gadolinium may be limited for frequent routine monitoring of the BBB opening in clinical applications. Purpose

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Monitoring of acoustic cavitation in microbubble presented ...
Power ultrasound typically uses acoustic frequencies between 20 and 100 kHz and is useful in invasive applications, which gives impact to physical, chemical and biological properties of cannabis beverages and edible processing, preservation and safety.

Cardiovascular disease (CVD) is the leading cause of death in the United States and globally. CVD-related mortality, including coronary heart disease, heart failure, or stroke, generally occurs due to atherosclerosis, a condition in which plaques build up within arterial walls, potentially causing blockage or rupture. Targeted therapies are needed to achieve more effective treatments. Echogenic liposomes (ELIP), which consist of a lipid membrane surrounding an aqueous core, have been developed to encapsulate a therapeutic agent and/or gas bubbles for targeted delivery and ultrasound image enhancement. Under certain conditions ultrasound can cause nonlinear bubble growth and collapse, known as "cavitation." Cavitation activity has been associated with enhanced drug delivery across cellular membranes. However, the mechanisms of ultrasound-mediated drug release from ELIP have not been previously investigated. Thus, the objective of this dissertation is to elucidate the role of acoustic cavitation in ultrasound-mediated drug release from ELIP. To determine the acoustic and physical properties of ELIP, the frequency-dependent attenuation and backscatter coefficients were measured between 3 and 30 MHz. The results were compared to a theoretical model by measuring the ELIP size distribution in order to determine properties of the lipid membrane. It was found that ELIP have a broad size distribution and can provide enhanced ultrasound image contrast across a broad range of clinically-relevant frequencies. Calcein, a hydrophilic fluorescent dye, and papaverine, a lipophilic vasodilator, were separately encapsulated in ELIP and exposed to color Doppler ultrasound pulses from a clinical diagnostic ultrasound scanner in a flow system. Spectrophotometric techniques (fluorescence and absorbance measurements) were used to detect calcein or papaverine release. As a positive control, Triton X-100 (a non-ionic detergent) was added to ELIP samples not exposed to ultrasound in order to release encapsulated agents completely. Also, sham samples without Triton X-100 or ultrasound exposure were used as negative controls. Color Doppler ultrasound did not release encapsulated calcein or papaverine from ELIP even though there was a complete loss of echogenicity. In subsequent experiments, calcein and rosiglitazone, a hydrophobic anti-diabetic drug, were separately encapsulated in ELIP and exposed to pulsed Doppler ultrasound in a flow system while monitoring cavitation. Samples were exposed to ultrasound pressures above and below cavitation thresholds. In addition, Triton X-100 was used for positive control samples and sham samples were also tested without ultrasound exposure. Adding Triton X-100 resulted in complete release of encapsulated calcein or rosiglitzone. However, Doppler ultrasound exposure did not induce calcein or rosiglitazone release from ELIP in the flow system even when there was persistent cavitation activity and a loss of echogenicity. The results of this dissertation indicate that cavitation of encapsulated bubbles in ELIP solutions is not sufficient to induce drug release. It is possible that ultrasound-mediated thermal processes may have a stronger effect on ELIP permeability than cavitation activity. Perhaps ultrasound-triggered drug release will be possible by improving the ELIP formulation or encapsulating a different gas instead of air. However, cavitation is not a reliable indicator of ultrasound-mediated drug release with the ELIP formulations used in this dissertation.

The industrial interest in ultrasonic processing has revived during recent years because ultrasonic technology may represent a flexible green alternative for more energy efficient processes. A challenge in the application of high-intensity ultrasound to industrial processing is the design and development of specific power ultrasonic systems for large scale operation. In the area of ultrasonic processing in fluid and multiphase media the development of a new family of power generators with extensive radiating surfaces has significantly contributed to the implementation at industrial scale of several applications in sectors such as the food industry, environment, and manufacturing. Part one covers fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids. It also discusses the materials and designs of power ultrasonic transducers and devices. Part two looks at applications of high power ultrasound in materials engineering and mechanical engineering, food processing technology, environmental monitoring and remediation and industrial and chemical processing (including pharmaceuticals), medicine and biotechnology. Covers the fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids. Discusses the materials and designs of power ultrasonic transducers and devices. Considers state-of-the-art power sonic applications across a wide range of industries.

This book offers a systematic introduction to the engineering principles and techniques of cavitation in biomedicine on the basis of its physics and mechanism. Adopting an interdisciplinary approach, it covers areas of interest ranging from physics and engineering to the biological and medical sciences. Individual chapters introduce the fundamentals of cavitation, describe its characterization, control and imaging techniques, and present cavitation-enhanced thermal and mechanical effects and their applications. Intended as both a reference work for graduate students, and as a guide for scientists and engineers who work with cavitation in biomedicine, it provides a broad and solid foundation of knowledge. The aim is to bridge the different disciplines involved, and to promote cross-discipline research, thus encouraging innovations in the scientific research and engineering applications alike. Dr. Mingxi Wan is a professor at Department of Biomedical Engineering, Xi an Jiao Tong University, Xi an, Shaanxi, China; Dr. Yi Feng works at Department of Biomedical Engineering, Xi an Jiao Tong University, Xi an, Shaanxi, China; Dr. Gail ter Haar is a professor at The Institute of Cancer Research, Sutton, Surry, UK.

Energy Aspects of Acoustic Cavitation and Sonochemistry: Fundamentals and Engineering covers topics ranging from fundamental modeling to up-scaled experiments. The book relates acoustic cavitation and its intrinsic energy balance to macroscopic physical and chemical events that are analyzed from an energetic perspective. Outcomes are directly projected into practical applications and technological assessments covering energy consumption, thermal dissipation, and energy efficiency of a diverse set of applications in mixed phase synthesis, environmental remediation and materials chemistry. Special interest is dedicated to the sonochemical production of hydrogen and its energetic dimensions. Due to the sensitive energy balance that governs this process, this is seen as a "green process" for the production of future energy carriers. Provides a concise and detailed description of energy conversion and exchange within the single acoustic cavitation bubble and bubble population, accompanying physical and chemical effects Features a comprehensive approach that is supported by experiments and the modeling of energy concentration within the sonochemical reactor, jointly with energy dissipation and damping phenomenon Gives a clear definition of energy efficiency metrics of industrial sono-processes and their application to the main emergent industrial fields harnessing acoustic cavitation and sonochemistry, notably for the production of hydrogen

NOTE: This set consists of two volumes: Cleaning Agents and Systems and Applications, Processes, and Controls. Updated, expanded, re-organized, and rewritten, this two-volume handbook covers cleaning processes, applications, management, safety, and environmental concerns. The editors rigorously examine technical issues, cleaning agent options and systems, chemical and equipment integration, and contamination control, as well as cleanliness standards, analytical testing, process selection, implementation and maintenance, specific application areas, and regulatory issues. A collection of international contributors gives the text a global viewpoint. Color illustrations, video clips, and animation are available online to help readers better understand presented material.

Cleaning Agents and Systems is the first volume in the Handbook for Critical Cleaning, Second Edition. Should you clean your product during manufacturing? If so, when and how? Cleaning is essential for proper performance, optimal quality, and increased sales. Inadequate cleaning of product elements can lead to catastrophic failure of the entire system and serious hazards to individuals and the general public. Gain a competitive edge with proven cleaning and contamination-control strategies A decade after the bestselling original, the Handbook for Critical Cleaning, Second Edition helps manufacturers meet today s challenges, providing practical information and perspective about cleaning chemistries, equipment, processes, and applications. With 90% new or revised chapters plus supplementary online material, the handbook has grown into two comprehensive volumes: Cleaning Agents and Systems and Applications, Processes, and Controls. Helping manufacturers become more efficient and productive, these books: Show how to increase profitability and meet both existing and expected product demand Clarify the sea of print and Internet information about cleaning chemistries and techniques Address challenges of performance, miniaturization, and cost, as well as regulatory and supply chain pressures Offer clearly written guidance from the viewpoints of more than 70 leading industry contributors in technical, management, academic, and regulatory disciplines Overview chapters by the editors, industry icons Barbara and Ed Kanegsberg, meld the different viewpoints and compile and critique the options. The result is a complete, cohesive, balanced perspective that helps manufacturers better select, implement, and maintain a quality, value-added cleaning process. The first volume, Handbook for Critical Cleaning: Cleaning Agents and Systems, gives manufacturers a practical understanding of the variety and functions of cleaning chemistries and cleaning, rinsing, and drying equipment. Topics include aqueous, solvent, and "non-chemical" approaches. Readers can compare process costs, performance, and regulatory issues, and then choose their best option.

Part I: Fundamentals of ultrasound This part will cover the main basic principles of ultrasound generation and propagation and those phenomena related to low and high intensity ultrasound applications. The mechanisms involved in food analysis and process monitoring and in food process intensification will be shown. Part II: Low intensity ultrasound applications Low intensity ultrasound applications have been used for non-destructive food analysis as well as for process monitoring. Ultrasonic techniques, based on velocity, attenuation or frequency spectrum analysis, may be considered as rapid, simple, portable and suitable for on-line measurements. Although industrial applications of low-intensity ultrasound, such as meat carcass evaluation, have been used in the food industry for decades, this section will cover the most novel applications, which could be considered as

highly relevant for future application in the food industry. Chapters addressing this issue will be divided into three subsections: (1) food control, (2) process monitoring, (3) new trends. Part III: High intensity ultrasound applications High intensity ultrasound application constitutes a way to intensify many food processes. However, the efficient generation and application of ultrasound is essential to achieving a successful effect. This part of the book will begin with a chapter dealing with the importance of the design of efficient ultrasonic application systems. The medium is essential to achieve efficient transmission, and for that reason the particular challenges of applying ultrasound in different media will be addressed. The next part of this section constitutes an up-to-date vision of the use of high intensity ultrasound in food processes. The chapters will be divided into four sections, according to the medium in which the ultrasound vibration is transmitted from the transducers to the product being treated. Thus, solid, liquid, supercritical and gas media have been used for ultrasound propagation. Previous books addressing ultrasonic applications in food processing have been based on the process itself, so chapters have been divided in mass and heat transport, microbial inactivation, etc. This new book will propose a revolutionary overview of ultrasonic applications based on (in the authors opinion) the most relevant factor affecting the efficiency of ultrasound applications: the medium in which ultrasound is propagated. Depending on the medium, ultrasonic phenomena can be completely different, but it also affects the complexity of the ultrasonic generation, propagation and application. In addition, the effect of high intensity ultrasound on major components of food, such as proteins, carbohydrates and lipids will be also covered, since this type of information has not been deeply studied in previous books. Other aspects related to the challenges of food industry to incorporate ultrasound devices will be also considered. This point is also very important since, in the last few years, researchers have made huge efforts to integrate fully automated and efficient ultrasound systems to the food production lines but, in some cases, it was not satisfactory. In this sense, it is necessary to identify and review the main related problems to efficiently produce and transmit ultrasound, scale-up, reduce cost, save energy and guarantee the production of safe, healthy and high added value foods.

This Special Issue scrutinizes the use of ultrasonic-cavitation melt treatment in technology of high-quality metallic alloys with improved mechanical properties, and assesses the driving mechanisms of cavitation-induced effects, such as grain refinement, degassing, wetting, and particle distribution. In this context, the research published in this Special Issue considers the interaction between the cavitation field and acoustic streaming with the melt flow and the suspended solid/liquid phases, the characterization and mapping of cavitation activity in a melt volume, and the possibility of achieving high efficiency in processing large melt volumes through technological approaches for the commercial implementation of ultrasonic processing technology.

Papers presented at the symposium held in Charlotte, NC, March 1989, examine the phenomenon in which elastic or stress waves are emitted from a rapid, localized change of strain energy in a material. The first section focuses on AE sensors and systems. The second deals with fundamental investigation