

6th - 8th June 2016 | Caparica | Portugal

ULTRASONICS 2016

II International conference on ultrasonic-based
applications: from analysis to synthesis

Conference Topics

Ultrasound in Analytical Chemistry and Food Chemistry | Ultrasound in Organic and Inorganic Synthesis
Ultrasound in Synthesis of New Materials: Studies and Applications | Ultrasound in Biomedicine and Biochemical Applications
Ultrasound and Physics and Physics Applications | Ultrasound and Environmental Applications | Ultrasound and Engineering

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2nd International Conference on Ultrasonic-based
Applications: from analysis to synthesis

Book of Abstracts

Caparica - Almada, Portugal

6th – 8th JUNE 2016

Book of Abstracts of the 2nd International Conference on Ultrasonic-based Applications:
from analysis to synthesis
ULTRASONICS 2016

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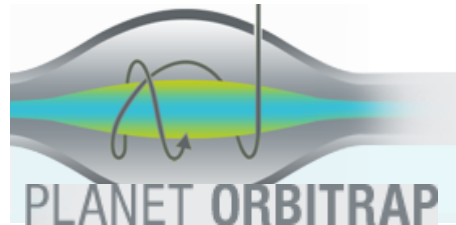


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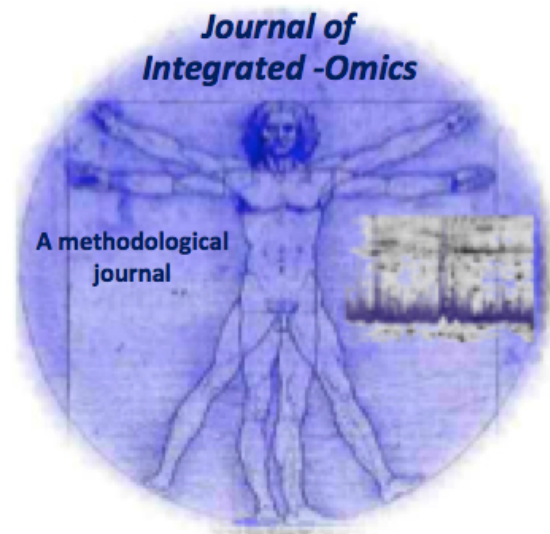
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Welcome

Dear Friends and colleagues,

Curie's name is associated to radioactivity unless your domain of research is ultrasound. Pierre Curie is the classical example of a man with a large background of success in different scientific areas. He co-discovered the piezoelectric effect. It was one small step for one man but a giant leap for ultrasonic-kind. Since then, the applications of ultrasonic energy have never ended of growing up. Thus, the uses of ultrasonic energy span by a large number of applications such as medicine, for humans and animals; physical therapy; industrial cleaning; solid disintegration; chemistry; engineering; communication and even as a weapon. I began to work with ultrasonic energy in 1996. At that time a project dealing with extraction of metals from biological tissues and sediments using ultrasonic energy was offered to me as master project. The books of Professor Mason were invaluable for the understanding of the principles of ultrasonic energy at that time. Hard, patient laboratory work leads to a ultrasonic-based doctorate in Analytical Chemistry. Eventually, I became very skilled in the field of ultrasonic energy, and I had the privilege to publish a book for Wiley: "Ultrasound in Chemistry; Analytical applications". As time went by, It was realized that the ultrasonic community needed a conference at the interface, one conference to unite all members, one conference to find them, one conference to bring them all and in the interface bind them. Then, the ultrasonic series of conferences eventually arise.

The 2016 edition presents outstanding plenary speakers and keynotes that are a promise of an unforgettable conference. Medicine, engineering, food processing, synthesis of new materials, organic and inorganic synthesis and analytical chemistry are some of the subjects presented during the conference.

This year the conference is going to be held in an exceptional place. The venue has indoor and outdoor pools, an excellent gym, a beautiful SPA and a golf course. Also, the beach is located at a reasonable distance (5 min by taxi). Furthermore, two visits to Lisbon are programmed.

Last but not least, the presence of Professor Mason is greatly acknowledged. He was and still is a mentor to many of us, as he inspired us to believe in ultrasound through his many books. Thanks indeed.

On behalf of the organizing committee

J. L. Capelo

Ultrasonics 2016 Conference Chair

SG18-Antibacterial and antioxidant capacity of egg white hydrolysates screened from proteolysis-assisted high intensity ultrasound treatment

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Abstract

Purpose: The main purpose of this research was to investigate the effect of high-intensity ultrasound treatment on one-step proteolysis of egg white proteins (EWPs) using commercial food-grade protease Alcalase as well as evaluating antioxidant and antibacterial capacity of sonicated hydrolysates rich in bioactive peptides.

Experimental description: Prior to the Alcalase proteolysis, a series of 10 % (w/w) egg white (EW) solution samples were exposed to ultrasonic waves in ultrasonic water bath with a frequency of 40 kHz during 15 min and ultrasound probe high-intensity with a frequency 20 kHz during 15 min. The sonicated EWP solutions were intensively hydrolysed by the addition the bacterial endopeptidase from *Bacillus licheniformis*, namely Alcalase in the amount of 2 % (w/w). The proteolysis was performed in a glass batch reactor with mechanical stirring at 240 rpm at optimum condition for Alcalase (50 °C and pH 8.0). Upon completion of the hydrolysis, the reaction mixture was cooled down to room temperature and centrifuged at 12,000×g for 10 min. The bioactive hydrolysate was finally collected by decantation and stored at 4 °C. The antioxidant capacity of bioactive hydrolysates was evaluated by measurements the oxidation of β-carotene linoleic acid emulsion and scavenging of hydroxyl radicals.

The antibacterial capacity was estimated against Gram-positive bacteria (*Staphylococcus aureus* ATCC 25923) and Gram-negative bacteria (*Escherichia coli* ATCC 25922) by hydrolysates' susceptibility of agar diffusion.

Results: The hydrolysate derived by proteolysis-assisted ultrasound probe (UPH) has shown to be most effective in oxidation of β-carotene linoleic acid emulsion compared to hydrolysate acquired by proteolysis-assisted ultrasound bath (UBH). The values of inhibition of lipid peroxidation were 85.4±0.42 and 73.9±0.49% for UPH and UBH respectively. The both hydrolysates were found to be potent scavengers of hydroxyl radicals compared to the untreated EW and its hydrolysate. Namely, UPH and UBH hydroxyl radical scavenging activities were 61.6±0.18 and 62.3±0.22 %, respectively. The results acquired from this research pointed that EWP hydrolysates have an intense inhibitory activity on Gram-positive bacteria, poor on Gram-negative bacteria, especially UPH. The inhibition zone both sonicated hydrolysates were significantly greater than control. Minimal inhibitor

concentration against *S. aureus* and *E. coli* of UPH was significantly higher than UBH (63.3 ± 0.83 $\mu\text{g/mL}$ and 79.1 ± 1.04 $\mu\text{g/mL}$, respectively).

Conclusions: This research emphasized that by proteolysis-assisted high intensity ultrasound treatment, received hydrolysate with improved antimicrobial and antioxidant activities can be promoted enhancing utilization of EWPs as bioactive component of dietary supplements. Likewise, the results have been indicated that the producing bioactive hydrolysates from intact EWPs were affected by the ultrasound treatment type.

Key Words: Egg white; High-intensity ultrasound; Hydrolysate; Antioxidant capacity; Antibacterial capacity

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