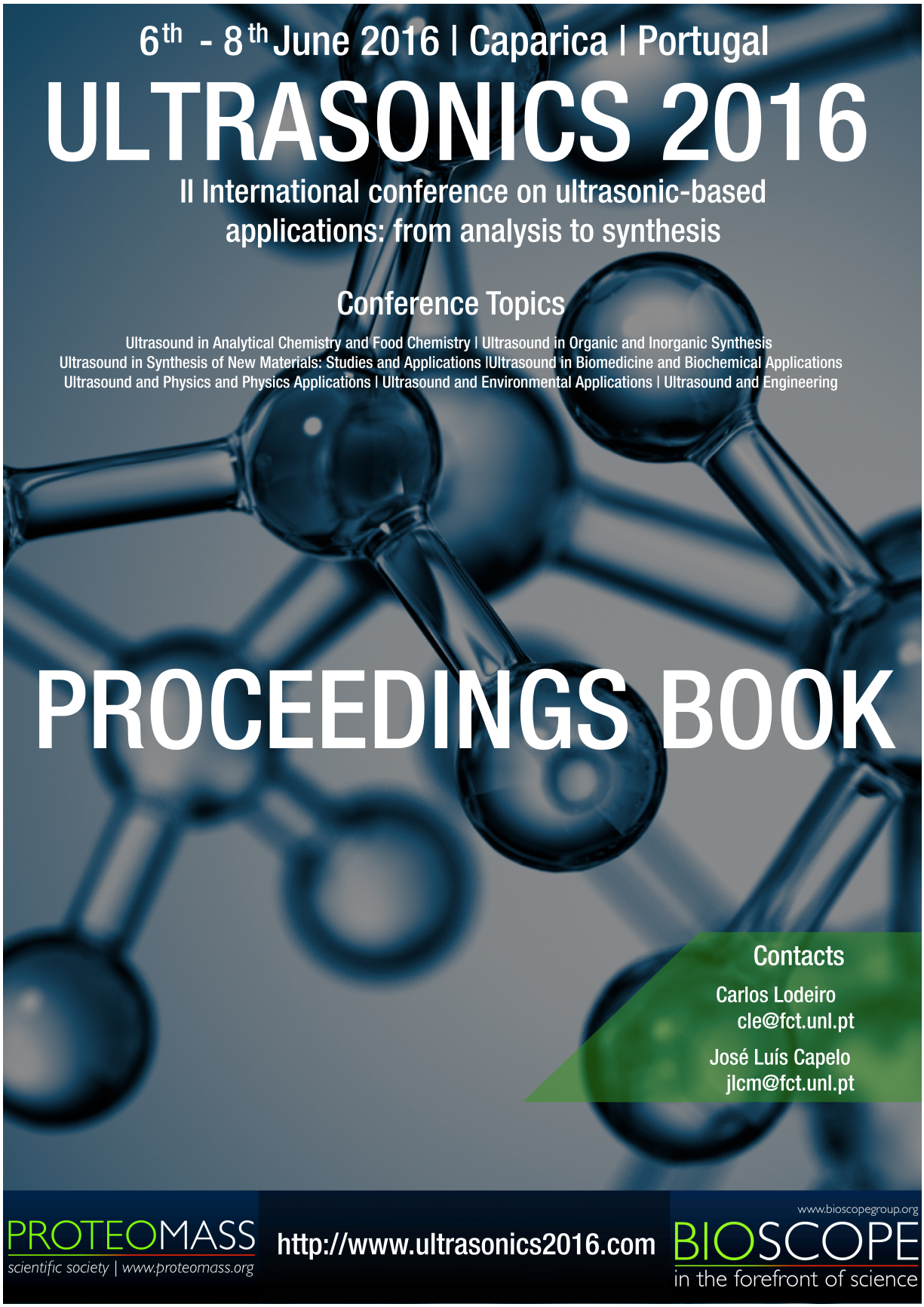
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**Caparica - Almada, Portugal**

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ULTRASONICS 2016

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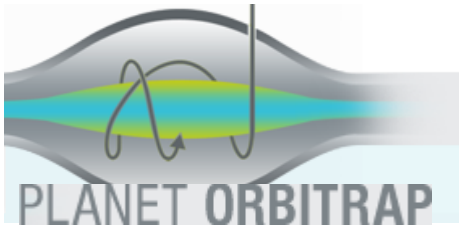


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# Welcome

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

# SG6-Structural and functional characterization of papain-assisted ultrasound pretreated egg white hydrolysis

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**Abstract**

**Purpose**: The main objective of this research is to quantitatively investigate the impact of high intensity ultrasound waves generated by probe-type sonicator on the selected functional and structural properties of papain-assisted egg white protein hydolysis (PEWPHs). As well, the effect of pretreatment time on the susceptibility to proteolysis was investigated.

**Experimental description**: 10 % (w/w) aqueous solution of egg white proteins (EWPs) was sonicated at an actual ultrasonic power of 30.7 W. The trials have been accomplished using the modified vibratory cavitation test set up source at resonant frequency of 20 ± 0.2 kHz during the different pretreatment time (2, 5, 10, 15 and 20 minutes). The functional properties of the PEWPHs were probed in terms of solubility, digestibility and foaming ability. In order to understand the molecular structure and morphology of ultrasound pretreated EWPs, sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and scanning electron microscopy (SEM) were employed to image the materials. The performance of ultrasound PEWPHs were compared to their untreated counterparts.

**Results**: The proteolytic pattern of papain-assisted EWP hydrolysis was significantly improved for all pretreatment time applied, but the prolonged exposure to ultrasound of 20 min seemed to have a negative effect on the EWPs hydrolysis. The treatment of the EWPs during 5 min can be adopted as the optimal for PEWPHs. Ultrasound pretreatment seemed to increase solubility and digestibility and also caused enhanced foaming properties of PEWPHs compared to the control (untreated EWPs). It was found that particle morphology (SEM images) of PEWPHs were completely different and the less small particles were trapped in large dents of large particles and narrow range of particle size was observed for ultrasound pretreated PEWPHs. SDS-PAGE patterns affected on the release some small peptides (< 14.4 kDa) causing a significant decrease in molecular weight of ultrasound pretreated PEWPHs.

**Conclusions**: The outcomes presented here suggest that the application of the probe-type sonicator have na important role in the improvement of functional and structural properties of PEWPHs and the combined

ultrasound pretreatment and enzymatic hydrolysis, not only represents a rapid, efficient and reliable alternative to improve the quality of EWPs, but it also has the potential to develop new products with a unique functionality.

**Key Words**: egg white proteins, proteolysis, ultrasound pretreatment, structural characterization, functional properties

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