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WORLD NANO 2021

BOOK OF ABSTRACTS

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Theme:

Presenting excellency of Nanotechnology
to transform the World

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Chitosan-olive oil microparticles for phenylethyl isothiocyanate delivery

Phenylethyl isothiocyanate (PEITC) is released from the enzymatic hydrolysis of gluconasturtiin, the most abundant glucosinolate found in watercress (a vegetable from the family Brassicaceae) by the enzyme myrosinase. Among all the isothiocyanates, PEITC is one of the most extensively studied with various biological activities such as antimicrobial, antioxidant and anti-inflammatory. Several studies suggested that PEITC exhibits cancer preventive and therapeutic effects on multiple types of cancers and is one of the isothiocyanates that is being tested in clinical trials. PEITC is highly reactive due to its considerably electrophilic nature. Furthermore, it is hydrophobic and has low stability, bioavailability and bioaccessibility, restricting its use in biomedical and nutraceutical or food applications. Thus, the encapsulation of this agent has the function of overcoming these limitations, promoting its solubility in water, and stabilizing it, preserving its bioactivity. So, polymeric microparticles were developed using chitosan-olive oil-PEITC systems. For this, an optimisation process (factors: olive oil: chitosan ratio and PEITC: chitosan ratio) were implemented through a 3-level (32) factorial experimental design. The responses were: the particle size, zeta-potential, polydisperse index, and entrapment efficiency. The optimal formulation was further characterized by FTIR and biocompatibility in Caco-2 cells. Optimal conditions were olive oil: chitosan and PEITC: chitosan ratios of 1.46 and 0.25, respectively. These microparticles had a size of 629 nm, a zeta-potential of 32.3 mV, a polydispersity index of 0.329, and an entrapment efficiency of 98.49%. We found that the inclusion process affected the optical behaviour of the PEITC, as well as the microparticles themselves and their interaction with the medium. Furthermore, the microparticles did not show cytotoxicity within the therapeutic values of PEITC. Thus, PEITC was microencapsulated with characteristics suitable for potential biomedical, nutraceutical and food applications.

Biography:

Dr. Ezequiel R. Coscueta is a Researcher at the Centre for Biotechnology and Fine Chemistry and an Invited Assistant Professor at Universidade Católica Portuguesa. He graduated in Biotechnology at Universidad Nacional del Litoral (2013) and obtained his PhD in Biological Sciences from the Universidad Nacional de Rosario (2018), both from Argentina. He co/authored 12 articles published in international specialized journals and 2 book chapters. His main background is in biotechnology for agri-food by-products valorisation. Additionally, his recent work led him to venture into nanotechnology with a focus on biomedical applications for the gastrointestinal tract, which captured his total interest.

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