18th World Congress on
Infection Prevention and Control

9th International Conference on
Polymer Science and Polymer Chemistry

22nd World Congress on
Medicinal Chemistry and Drug Design

July 04-05, 2022

WEBINAR

Betalains-gelatin micro particles by electrospray: Preparation and characterization

José Luis Pompa-Ramos
University of Sonora, Mexico

The large amount of food that is deteriorated by microbial growth and lipid oxidation reaction, causes poisoning in living beings, as well as, economic losses in the world, due to the loss of these. For which, it has been proposed to use techniques to coat different types of food, using bioactive compounds that have antioxidant and antimicrobial properties. Among these bioactive compounds are betalains. Betalains are nitrogenous pigments, soluble in water, which are composed by two large structural groups: Betacyanins (provide red-violet coloration) and betaxanthins (provide yellow-orange coloration). Betalamic acid is present in these groups which is considered the structural unit, and the nature of the additional residue establishes the classification of the pigment. Betalains exhibit characteristics that are attractive to different sectors of the food, pharmaceutical, and cosmetic industries due to its properties antioxidant, anticancer and anti-inflammatory activity. However, betalains have low stability to environmental factors; such as light, temperature, and humidity. The development of edible nano-micro encapsulation matrices is considered a suitable option to protect bioactive compounds, as in the case of betalains, and one of the most used techniques to produce this type of particles is the coaxial electrospray.This technique allows to protect active compounds in the nucleus of the polymeric matrices, nevertheless, to be able to use them as food coating to prolong their shelf life, human-friendly and environmentally friendly polymers, must be used.

One of the polymers that meet these characteristics is gelatine. Gelatine is a protein obtained from hydrolysis of collagen, which is considered the most abundant organic component found in the bones and skin of mammals. This polymer can be synthesized from the remains of chicken, cattle or pigs, and due to it´s many characteristics, this biopolymer is used in the food and pharmaceutical industry. For this reason, the objective of this work is to prepare and characterize betalain-gelatin microparticles by coaxial electrospray, for their potential application as edible coatings, in order to prolong the shelf life of different foods. Firstly, betalains were obtained through the pitaya fruit (Stenocereus thurberi). The physicochemical characteristics of the pitaya were evaluated, determining the pH, titratable acidity, humidity, total sugars and color by CIELab. Likewise, a physicochemical characterization of the gelatin solutions to be used in the coaxial electrospray was carried out, determining density, surface tension, conductivity and rheological properties. To obtain betalain-gelatin microparticles, the concentration of gelatin was varied at 8, 10 and 12% (w/v) in acetic acid at 20% (v/v). The parameters evaluated in the coaxial electrospray technique to obtain betalain-gelatin particles were applied voltaje, flow rate, distance between needle and collector plate; as well as, the concentrations of the solutions. The material obtained was evaluated by the techniques of SEM, FTIR, TGA, and DSC. By SEM, microparticles with spherical and monodisperse morphology were observed at betalain concentration of 1 and 3% (w/v) with an average diameter of 864 and 832 μm, respectively. In the analysis by FTIR, gelatin showed it

characteristic bands: amide I at 1,625 cm-1, CO= and NH- bond stretching vibration, amide II at 1519 cm-1, bending vibration N-H bond, and amide III at 1233 cm-1 bending vibration C-N bond. The betalains showed characteristic bands at 1018 cm-1, C-O bond of the aromatic ring. For coaxial particles, the concentration of betalains caused an increase in the amide band at (3280 – 3284 cm-1). In the thermostability study, the coaxial gelatin particles with betalains at 1 and 3% (w/v) showed greater thermal stability with a decomposition temperature of 336°C (losing 70% of the weight). It is concluded, that the concentration of betalains affects the thermal stability of the coaxial particles obtained and that the microparticles have potential application as edible coatings in the food industry, due to properties of betalains, mentioned above.

Biography

José Luis Pompa Ramos was born on July 11, 2001 in Hermosillo, Sonora, México. Currently is a mining engineering student at the University of Sonora (UNISON), and is the secretary of the Student Council of Student Association (CESA) at the University of Sonora. He has a scholarship as a level 3 research assistant of the National Council for Science and Technology (Mexico).

Received: June 06, 2022; **Accepted**: June 08, 2022; **Published**: July 04, 2022