



TwinPrebioEnz

International conference:

BIOCHEMICAL ENGINEERING & BIOTECHNOLOGY

For Young Scientists

BOOK of ABSTRACTS





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THE USE OF STARCH AND β -LACTOGLOBULIN COMPOSITE HYDROGELS AS FRAMEWORKS FOR PRESERVING C-PHYCOCYANIN

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Our study aimed to preserve the natural blue dye of C-phycoerythrin (C-PC) phycobiliprotein from *Spirulina* microalgae due to its importance in the food industry. We incorporated C-PC into hydrogels formed by combining starch and β -lactoglobulin (BLG) using high-pressure (HP) processing to achieve this objective. Notably, thermal treatment resulted in the complete loss of colour derived from C-PC.

We performed a comprehensive characterization of the resulting HP gels by rheology measurements, texture profile analysis (TPA), small-angle X-ray scattering (SAXS), and scanning electron microscopy (SEM).

Different compositions of binary (BLG/C-PC) and ternary (starch/BLG/C-PC) systems were processed under high-pressure (HP) conditions reaching up to 4,500 bar. The C-PC pigment was effectively preserved by mixing BLG and starch with C-PC at pH 7, maintaining concentrations of 180, 5, and 10 mg/mL, respectively. The same concentrations of components were retained in the binary systems.

Rheological properties of the gels were determined using a rheometer with plane/plane geometry, and texture analysis was conducted through TPA. These findings enabled the assessment of food gel's properties, such as hardness, springiness, chewiness, and cohesiveness. The structural characteristics of the gels were determined by SAXS, offering insights into the interactions between C-PC, BLG, and starch after HP processing. Adding C-PC and starch formed solid gels with a larger mesh than the pure BLG gels. SEM scans of the gel surface revealed that all components influenced the overall morphology of gels. Even at low concentrations, the addition of starch notably influenced the gels' visual appearance and mechanical properties. Our investigation highlights the superior effectiveness of HP treatment in the preservation of C-PC compared to high-temperature treatment, evident in the sustained colour integrity of the C-PC blue dye.

Keywords: C-phycoerythrin, high-pressure processing, high temperature, food gels, rheology, texture profile analysis, small angle neutron scattering, scanning electron microscopy

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