SIB 2017

59th CONGRESS

Italian Society of Biochemistry and Molecular Biology

Caserta, September 20 – 22, 2017

BOOK OF ABSTRACT

Preparation and characterization of grass pea-based bioplastics prepared in the presence of transglutaminase

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The aim of this work was to prepare bioplastics from renewable and biodegradable molecules. Bioplastics are alternative to petroleum-based plastics, the latter extremely pollutant since their combustion contributes to the CO_2 enrichment in the atmosphere. In particular, we produced bioplastics by using as biopolymer source the grass pea (*Lathyrus sativus)* flour, the proteins of which were structurally modified by means of microbial transglutaminase (mTG), an enzyme able to catalyze isopeptide bonds between glutamines and lysines. mTG has been widely proposed for improving technological features of several protein-based edible films (1,2). We demonstrated that proteins from grass pea flour are endowed with glutamine and lysine residues able to act as effective acyl donor and acceptor substrates for mTG, as demonstrated by the formation of high molecular weight protein polymers following flour enzymatic treatment. After analyzing the film forming solutions by means of zeta-potential determination, the bioplastics, produced by casting, were characterized according to their mechanical, gas barrier and optical properties. The presence of mTG allowed to obtain films more mechanically resistant. On the other hand, the permeability and optical properties were not affected by the enzyme treatment. The visualization by Scanning Electron Microscopy (SEM) demonstrated that the enzyme-modified films possessed a more compact and homogeneous structure. In addition, digestion experiments under physiological conditions (1), performed in order to obtain information useful for applying these novel biomaterials as carriers in the pharmaceutical sector, indicated that the mTG-treated coatings might allow the delivery of bioactive molecules in the gastro-intestinal tract.

References

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