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Enzymes and advanced materials for active food packaging

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The great antimicrobial and antioxidant potential of enzymes makes them prone to be used as active packaging materials. Major drawbacks are connected to the use of enzymes freely dispersed in solution, due to reduced protein stability. The immobilization of enzymes on solid supports to create biocatalytic interfaces has instead been proven to increase their stability and efficiency. A recombinant fungal laccase isoform was tested as potential antitoxin agent for food packaging. It has been successfully immobilized in its active form into hydrogel films. The recombinant enzyme, coupled with a proper laccase-mediator system, was effective in degrading widespread and very hazardous mycotoxins such as aflatoxin M1 and aflatoxin B1. As a second food packaging solution, advanced materials composed of hydrogel layers coated on hydrophobic membranes were used to grow lysozyme crystals as antimicrobial agent. The overall catalytic efficiency of the new antimicrobial biofilm was increased by a factor two compared to the pure enzyme dissolved in solution at the same quantity, and a 60-times lower amount of lysozyme was necessary to achieve a comparable antimicrobial activity.

Biography

Rocco Caliandro has obtained his PhD from the University of Bari working in High-Energy Physics at CERN. Since 2001, he is a Researcher at the Institute of Crystallography of CNR, where he leads a group devoted to structural characterization of bio-macromolecules by x-ray techniques. His research activities are carried out by using synchrotron light sources to carry out x-ray diffraction, X-ray Absorption Spectroscopy (XAS) and Small Angle X-ray Scattering (SAXS) experiments on proteins and crystalline materials. He has published about 130 scientific publications (H-index=25; number of citations=4375, average citations per article=34.7, source ISI web of Knowledge) in international journals with high impact factor.

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