# NOVEL ACTIVE BIOPOLYMER MATERIALS FOR THE FOOD PACKAGING

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**Body**

The presence of residual oxygen inside food packaging can significantly affect the organoleptic properties of food and increase microorganism proliferation, decreasing the shelf-life of the products. In this context, the food packaging industry has been investigating new bio-based environmentally friendly multifunctional materials that act as oxygen scavengers and antimicrobial agents. Therefore, in the present work, a new generation of bio-based active films and fibres containing metallic (Zn) and bimetallic (Zn and Fe) nanoparticles (NPs) is developed. Zinc (Zn) and iron (Fe) nanoparticles (NPs) can enhance oxygen absorption capacity, while the oxidized form of Zn, the ZnO, has relevant antimicrobial properties. The NPs were deposited on poly-lactic acid (PLA) films and PLA fibres (produced by electrospinning) by magnetron sputtering, resulting in two different architectures with dissimilar Fe NPs percentages (0, 10 and 20%). The effect of NPs on the structural and functional properties of the produced materials was evaluated at 60 % and 96 % relative humidity. The morphology and metallic composition of the samples were determined by scanning electron microscopy (SEM), and Inductively Coupled Plasma (ICP), respectively. The oxygen scavenging capacity was measured using a Piccolo sensor connected to sealed vials containing 5% oxygen. Finally, the antimicrobial assay was performed through the zone of inhibition (ZOI) test, and the Zn NPs migration was evaluated using different food simulants. Theresults showed all PLA films and fibres developed have significant oxygen scavengingcapacity, achieving the highest decrease of oxygen with the PLA film containing Zn/Fe-10%. All the samples presented promising antimicrobial activity against *E. coli* and *S. aureus*. On the other hand, the migration tests revealed that PLA films and fibres containing Fe showed the lowest migration values when 95% ethanol was used as the food simulant, independently of the Fe percentage. Thus, the developing biopolymers prove to be active materials with multiple properties that could be used in the food packaging industry.

**Palavras-chave : packaging materials**