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ELECTROSPUN NANOFIBERS AS A NOVEL ENCAPSULATION VEHICLE FOR FELIX O1 BACTERIOPHAGE FOR NEW FOOD PACKAGING APPLICATIONS

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Background & Objectives: Food contamination is one of the main issues in the food industry, and food packaging has been driven towards novel technologies to reduce bacterial contaminations. One of the possibilities is the development of antibacterial packaging by the encapsulation of bacteriophages, namely Felix O1, can provide protection against microbial pathogens like *Salmonella Enteritidis*.

This work aimed the encapsulation of Felix O1 into electrospun nanofibers to be used in biodegradable packaging as a controlling agent of *Salmonella Enteritidis* in food products.

Methods and Results: After the optimization of different electrospinning conditions (voltage, flow rate, polymer type, polymer concentration and type of solvent), polyvinyl alcohol (PVOH) with Felix O1 bacteriophage solution was electrospun on polyhydroxybutyrate/polyhydroxyvalerate film forming a layer composed by sub-micro nanofibers. The optimized conditions were: SM buffer solution of PVOH at 14% (w/v) at a flow rate 0.3 mL/h and applied voltage of 25 kV.

Conclusions: After the formation of nanofibers with a size around 100 nm (observed through Scanning Electron Microscopy), release tests in SM buffer for 1 h revealed a high bacteriophage viability (10^5), but still, there was a decrease of one log in phage titre. DSC and TGA results revealed differences between the films and the films with nanofibers, showing the influence of the nanofibers in the system namely in the thermal behavior. Results show that this new packaging system is promising for the development of active packaging using bacteriophages.

Significance and impact of the study: The encapsulation of bacteriophages through electrospinning shows high potential to be explored as a new feature in food packaging, as a possible solution for bacterial contamination in foods.

Keywords: Bacteriophage delivery, Electrospinning, *Salmonella Enteritidis*, Biopolymer film

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