**Functional edible films and coatings integrated with encapsulated oregano essential oil: characterization and application on meat products**

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The addition of pure oregano essential oil (OEO) in various food systems as an alternative to chemical food preservatives has been considered by many researchers as an eco-friendly approach. However, technological challenges arising from the direct incorporation into food products (i.e., susceptibility to degradation, high volatility, lipophilic nature, intensive aroma) limit its application1. To face these difficulties, the entrapment of OEO in wall materials via various processes has been proposed as a strategy to avoid any adverse effects. Additionally, the development of edible active packaging is considered as an effective means to preserve food of good quality and longer shelf-life.

In this direction, OEO encapsulated forms, successfully produced via nano spray drying and complex coacervation by using as wall materials the combinations of whey protein isolate-maltodextrin and hemp protein isolate or whey protein isolate-gum Arabic, respectively2-4, were introduced to biopolymer-based (gelatin) coatings/films to further enhance their protective effect. The resulting OEO-enriched systems were characterized in terms of their physicochemical, tensile and barrier properties (including thickness and moisture measurements, strength/elongation at break and Young’s modulus, water vapor, and oxygen transmission rate measurements)5, while a step forward was made by testing their antioxidant and antimicrobial activity in a real food system (fresh meat product). The obtained findings indicated the diverse impact of the different encapsulated OEO forms in the properties and the coating effect of the obtained films in comparison to that of control samples, and improvement of the shelf-life of the food samples during cold storage.

*References:*

1. Plati, F., Paraskevopoulou, A. (2022). Micro- and nano-encapsulation as tools for essential oils advantages’ exploitation in food applications: the case of oregano essential oil. *Food and Bioprocess Technology*, *15*, 949–977.
2. Plati, F., Ritzoulis, C., Pavlidou, E., Paraskevopoulou, A. (2021). Complex coacervate formation between hemp protein isolate and gum Arabic: Formulation and characterization. *International Journal of Biological Macromolecules*, *182*, 144–153.
3. Plati, F., Papi, R.M., Paraskevopoulou, A. (2021). Characterization of oregano essential oil (*Origanum vulgare* L. subsp. *hirtum*) particles produced by the novel nano spray drying technique, *Foods*, *10*, 2923.
4. Plati, F., Paraskevopoulou, A. (2023). Hemp protein isolate – gum Arabic complex coacervates as a means for oregano essential oil encapsulation. Comparison with whey protein isolate – gum Arabic system. *Food Hydrocolloids*, *136*, 108284.

*5* Matsakidou, A., Biliaderis, C.G., Kiosseoglou. V. (2013). Preparation and characterization of composite sodium caseinate edible films incorporating naturally emulsified oil bodies, *Food Hydrocolloids, 30,* 232-240.

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