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## **Electrostatic Spray Dryer: Alternative Drying Technology for ThermoSensitive Active Compounds**

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In many industries, spray drying and freeze drying are mainly used to obtain a powder form in the final product. On one hand, spray-drying is a continuous process, scalable and widely used for different applications such as dairy products, active pharmaceutical compounds, oil encapsulation... However, high temperature is needed to reach moisture content expectations and leads to the degradation of heat-sensitive compounds. On the other hand, freeze-drying is a batch process using sublimation to preserve the active during drying and is mainly used for pharmaceutical products, microorganism, ... The main limits of this process are energy cost and time consumption. An alternative continuous technology, namely electrostatic spray drying, is emerging for drying sensitive products reducing the production cost to compare to freeze dryer. In this process, in the presence of the electrostatic field, there is a migration of solvent to the surface of the droplet which allows to have a complete drying at low temperatures [1,2]. Moreover, it was assumed that the second phase of drying: the falling rate period, is negligible allowing the active compounds to be in contact with a temperature equal or below of the outlet temperature (between 40 - 80°C).

In this work, this phenomenon is studied to quantify the benefits to avoid degradation of active compounds like probiotics, enzymes and DHA oil. Moreover, the life cycle of this new technology on industrial scale is also evaluated.

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[2] A.K. Masum, J. Saxena, B. Zisu, 13-Electrostatic spray drying of high oil load emulsions, milk and heat sensitive biomaterials, *Food Engineering Innovations Across the Food Supply Chain*, Ed. Academic Press (2022) 237-246.