



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 37th cycle

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Development of hydrogel-based micro-reactors for the formulation of functional foods

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In the last years, the interest of consumers and major industrial players in postbiotic functional foods, has increased. The functional foods, confer beneficial effects on human health. Furthermore, a lot of companies are investing in this. Postbiotic means "a preparation of inanimate microorganisms and / or their components and metabolites produced during fermentation (organic acids, peptides, enzymes, bacteriocins ... etc), which confer benefits to the health of the host" [1]. With respect to probiotic products, which are well established on the food market, the main characteristics of a postbiotic are:

- greater stability, due to the absence of live microorganisms;
- higher safety profile than probiotics [2].

A Postbiotic food is essentially obtained by fermenting a food matrix , after which the bacterial charge is "inactivated" through a mild heat treatment.

Microbial immobilization through encapsulation is seen as a promising technique, especially with probiotic microorganisms, in order to provide them with a protective environment during the fermentation process and storage of postbiotic products, and their passage through the gastrointestinal tract [3-4]. Capsules can be also imagined as bioreactors: semi-permeable reactors within which to isolate the fermenting microorganism in order to confine it from the external environment, but at the same time to allow the diffusion of metabolites produced by the micro-fermentation process to the outside.

The choice of this innovative technology depends on two aspects:

- 1) the possibility of further optimizing the process, as the very small fermentation volume avoids spatial inhomogeneities in the fermentation process; these inhomogeneities are more present in industrial scale plants;
- 2) the possibility of confining the microorganism inside the capsules, allowing a simple recovery/separation.

References

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