

MAXIMIZING OF HEALTH BENEFITS OF FUNCTIONAL FOODS BY MICROENCAPSULATION



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WHY MICROENCAPSULATION ?



In the food industry, encapsulation process greatly contributed to the development of functional foods. The functional foods can contain bioactive components in encapsulated state, such as: vitamins, peptides, minerals, fatty acids, poly-unsaturated fatty acids, phytosterols, lycopene, antioxidants, enzymes and living cells such as probiotics

The different reasons that may lead to encapsulate the foods ingredients:

- for masking the bad tasting or smelling,
- to prevent the evaporation and degradation of volatile actives,
- to prevent the reaction of biocomponents with other components in food products during storage,
- to mix the immiscible or incompatible ingredients,
- to promote the conversion of liquid active agent into a powder, or dense solid into a floating product,
- to assure the controlled release of biocomponents,
- to enhance the stability of bioactives against the some physico-chemical agents : temperature, pH, moisture, enzymes, oxygen, redox potential, UV light.



RESULTS

"Danubian Dietetic Salami"

The innovative elements of the "Danubian Dietetic Salami" are the following:

- **replacement of animal fat with unrefined corn oil.** Corn oil is a significant source of energy, is very digestible, provides essential fatty acids (especially linoleic acid) and vitamin E, and is a rich source of polyunsaturated fatty acids, which help regulate blood cholesterol levels and elevated blood pressure. The presence of mucilaginous substances in unrefined corn oil do not impair on the salami quality.
- **utilization of fish miofibrillar protein** as stabilizing agent of protein-containing oil-in-water emulsions. The great advantage of this is total absence from the recipe of textured protein binders (soy or milk proteins) or some types of starches.
- **utilization of alginate microencapsulated essential pepper and coriander oils** instead of traditional spices for better stability of flavors. The stability of flavors in foods has attracted intense attentions because of its relationship with the quality and acceptability of foods. Most liquid food flavors are volatile and chemically unstable in the presence of air, light, moisture and high temperatures. Hence, it is beneficial to microencapsulate volatile ingredients prior to use in foods or beverages to limit aroma degradation or loss during processing and storage. Microencapsulation was made through ionotropic gelation using alginate. The microcapsules were obtained either with or without beta-carotene.
- **extraction of essential oils from pepper and coriander by supercritical fluid extraction (SCFE),** which offers an alternative method to conventional extraction of such substances.

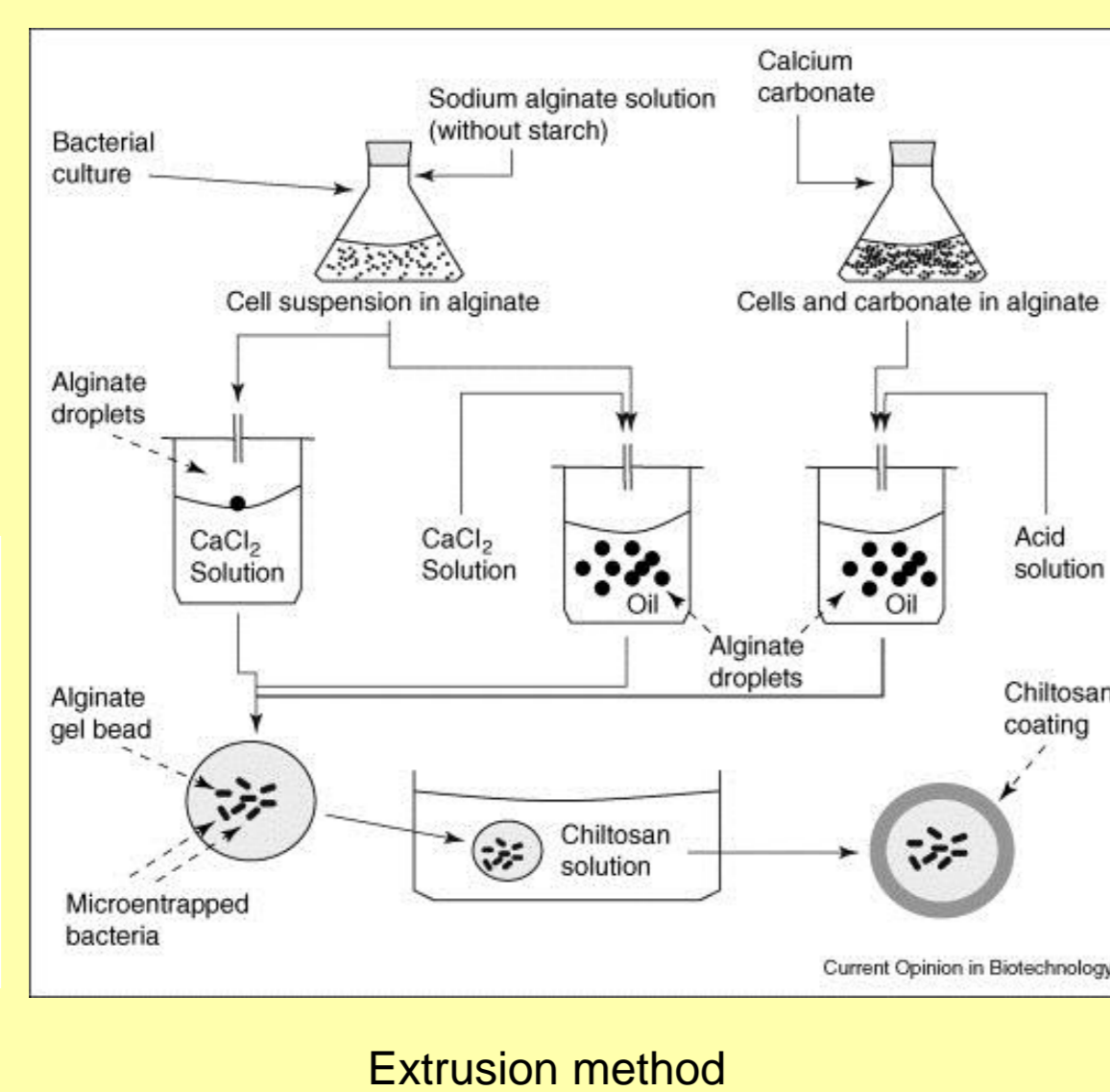
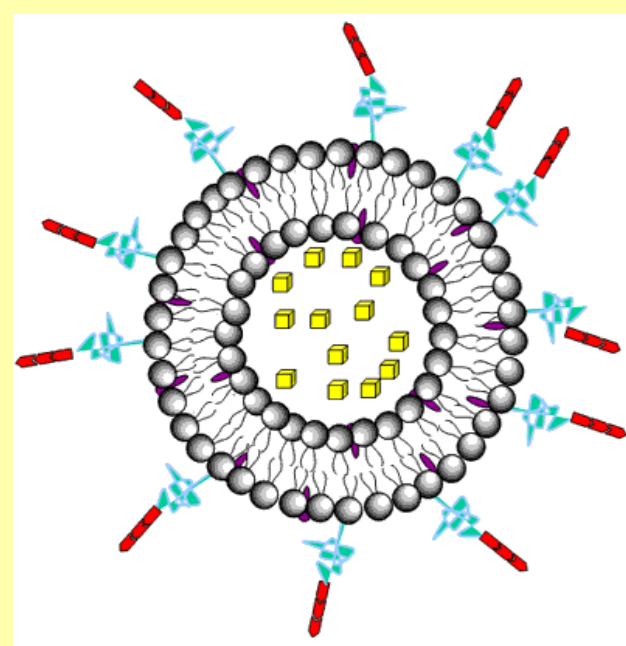
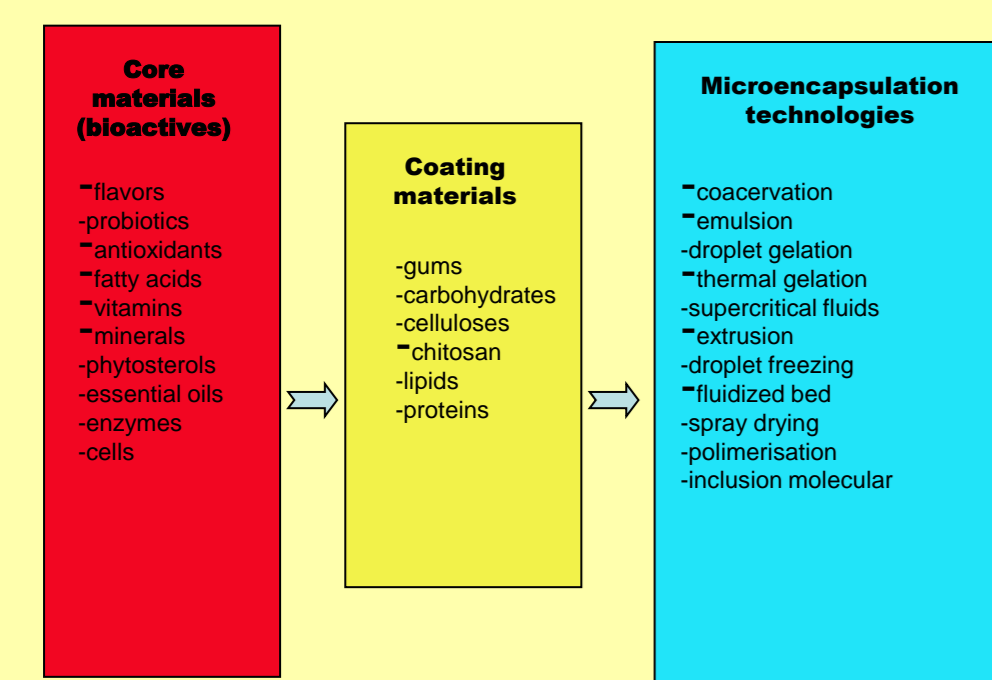
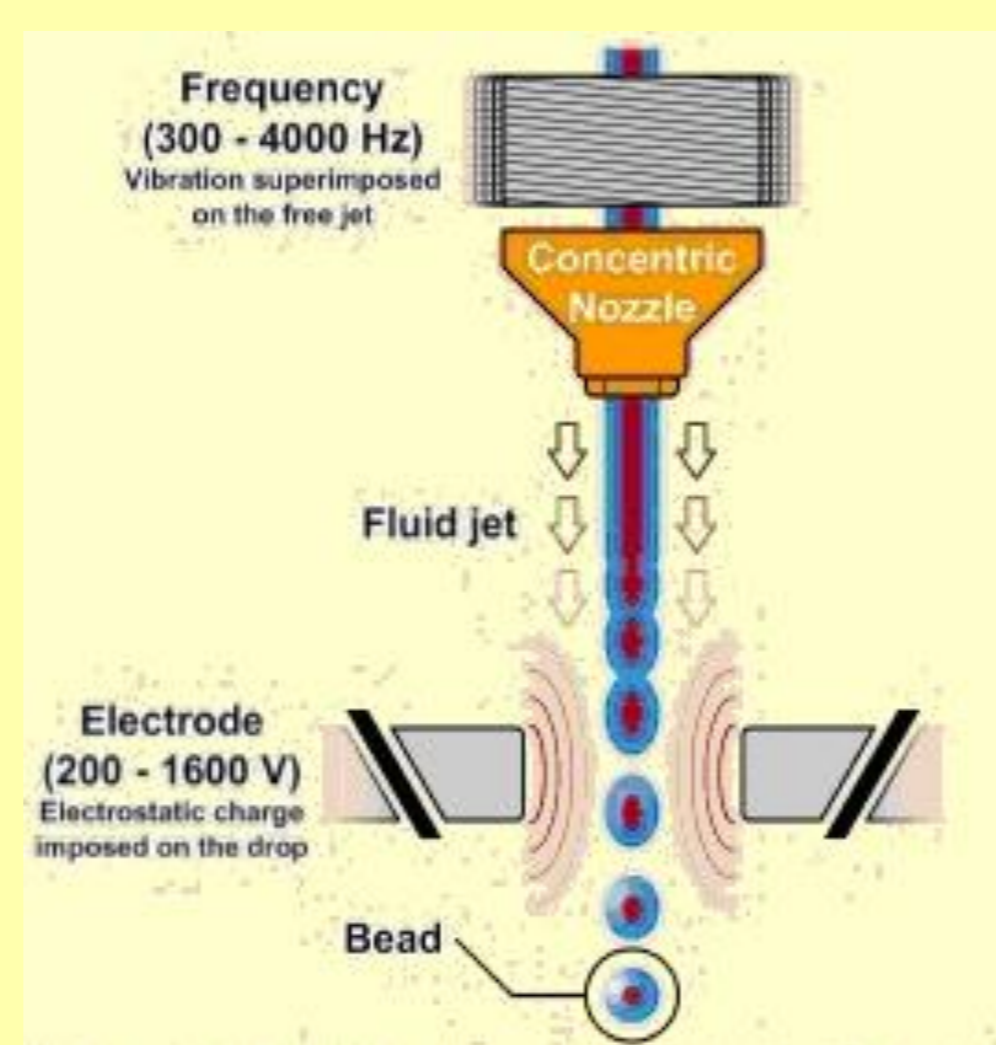
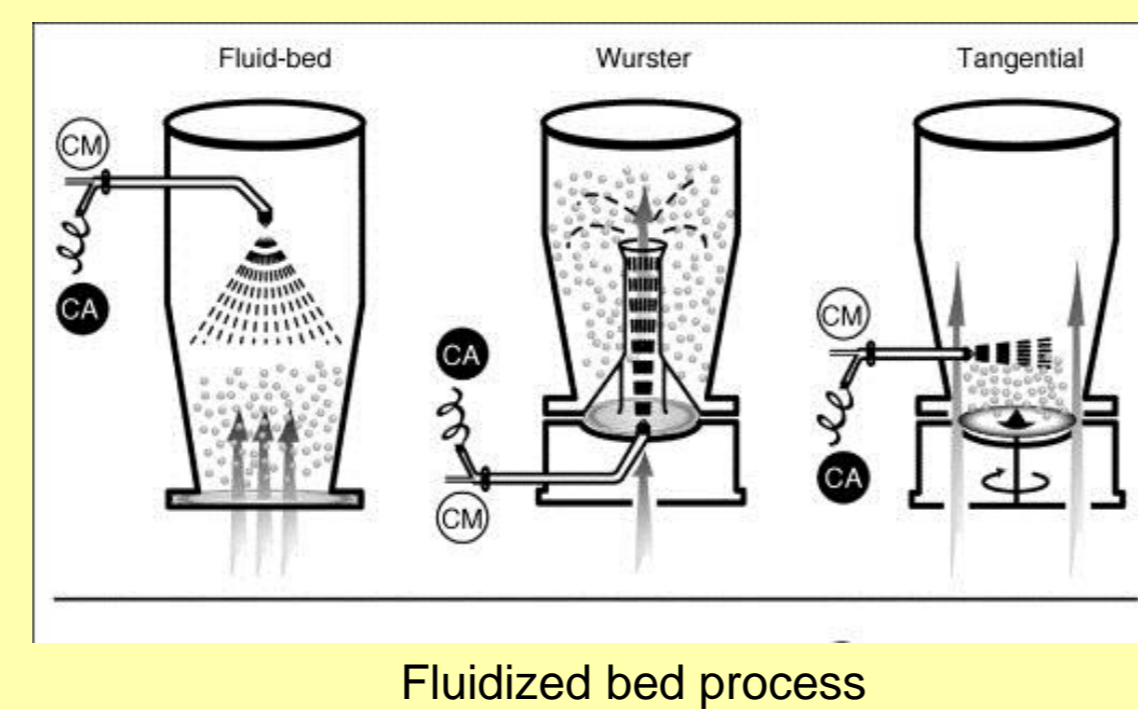
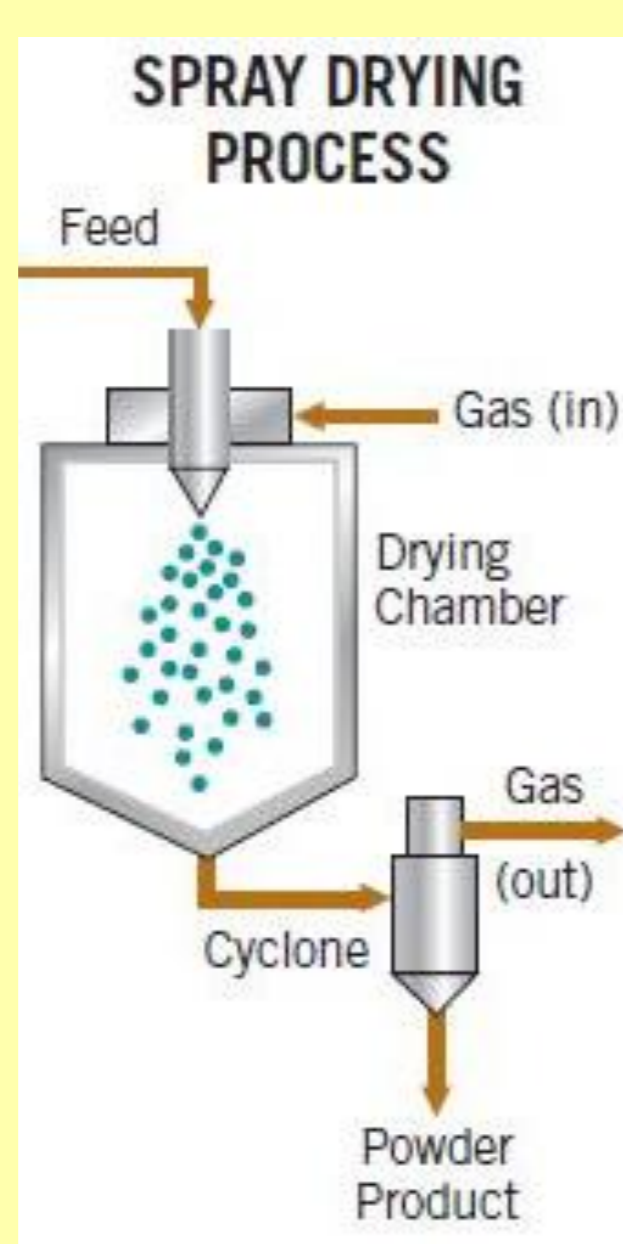
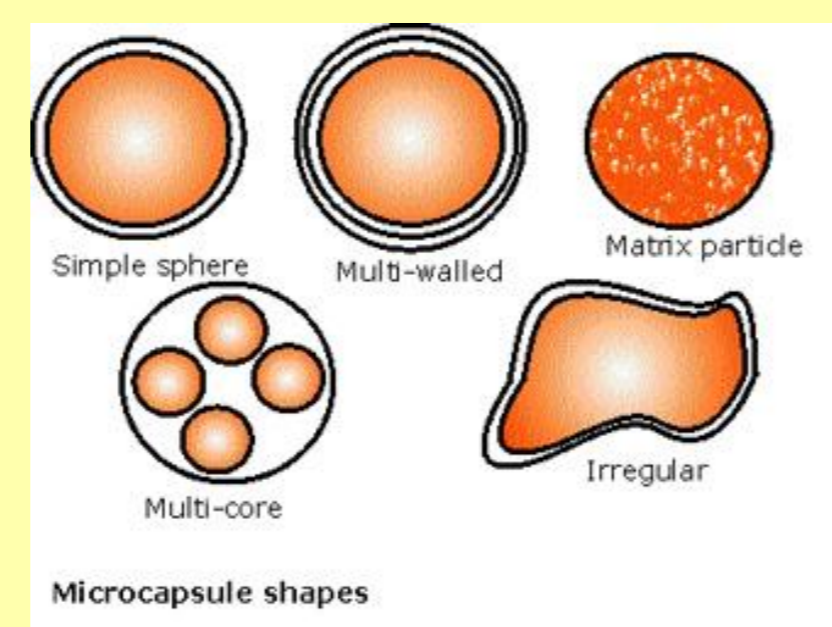


WHAT IS MICROENCAPSULATION ?

Encapsulation is defined as a physico-chemical process in which solids, liquids and gaseous substances are surrounded by a coating, or embedded in a homogeneous or heterogeneous particles, to give small capsules with diameters ranging from a few nm to a few mm.

Coating materials and technologies

- **Gums:** Gum arabic, sodium alginate, carragenan
- **Carbohydrates:** Starch, dextran, sucrose
- **Celluloses:** Carboxymethylcellulose, methylcellulose.
- **Lipids:** Bees wax, stearic acid, phospholipids.
- **Proteins:** Gelatin, albumin.



	Fluidized bed	Wurster	Spray drying	Spray cooling	Spinning disk	Licensee entrapment
Nature of the ingredient	hydrophilic	lipophilic	amphiphilic	solid	liquid	liquid
Particle size	>100 μm	<100 μm	n/a	n/a	n/a	n/a
Production capacity	batchwise	continuous	11	0.51	27h	57h
Controlled release mechanism	thermal	mechanical	digestion			
	straightforward	challenging	unfeasible			

Danubian Dietetic Salami

A BOILED AND SMOKED PRODUCT

Ingredients:

lean beef meat 62%, lean pork meat 10%, miofibrillar fish protein, unrefined com oil, water, iodised salt, garlic, sodium polyphosphate, spices: microencapsulated essential oils of black pepper and coriander (microcapsules also contain calcium alginate and beta carotene), preservative: sodium nitrite

500g

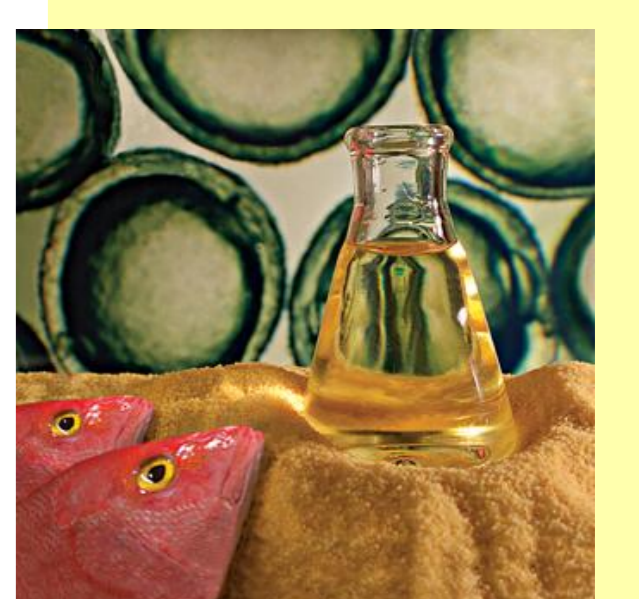
KEEP REFRIGERATED

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