

Encapsulation

Protect and Deliver your ingredients

Valuable ingredients often need protection from their environment during processing and shelf life to deliver the right functionality. Finding an encapsulation solution for a specific ingredient or product is a challenging task. NIZO offers a multi-disciplinary tailored approach in finding the right solution for your product.



When incorporating ingredients into a food often a form of protection is required. This includes protection to processing conditions, to prevent an ingredient to react with its environment or to mask undesired flavours of an ingredient.

Moreover, certain materials need protection to keep their functionality until needed, e.g. in the gut. Incorporation of such ingredients is a challenging task for food technologists. Encapsulation can help overcoming the problems.

Encapsulation

Encapsulation can be used for virtually any material that needs protection, masking or controlled release. It opens possibilities to:

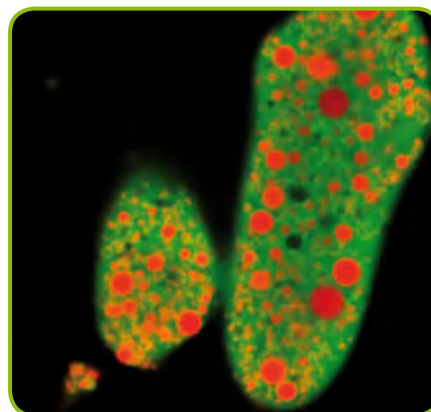
- increase nutritional value or fortify with certain components
- add new flavours and textures
- change flavour and texture experience and perception
- control functionality of ingredients during processing

No standard solutions

Each encapsulation solution needs to be targeted towards your specific situation. There is no standard solution.

Knowledge on ingredients, applications and encapsulation techniques is therefore required.

In the course of 60 years NIZO food research has built up this knowledge and we can assist you in finding an encapsulation solution fitting your needs.















Encapsulated nutritional oil (red) in cross linked complex coacervate-matrix (green).

Our approach

We start with mapping the challenges. Which ingredient should be encapsulated? What should this ingredient be protected against? Should it be released at a specific point during digestion or processing? Depending on the situation, our experts on texture, flavour, nutrition, microbiology and/or processing are asked for their input. Once these challenges have been identified an encapsulation strategy will be developed. After choosing a suitable technique, it can be further developed at NIZO's research facilities. Finally, NIZO food research can assist implementing the encapsulation solution in your process. This includes producing test batches in our food-grade Processing Centre.

Your benefits

- Introduction of healthy ingredients without problems
- Targeted delivery in the gut
- Protection of valuable ingredients to reduce costs
- Increased shelf life of your products
- Easier handling of sensitive compounds

TECHNOLOGY USED	ENCAPSULATION OF WHAT?	WHY?	COATING / MATRIX	PARTICLE STRUCTURE	CAPSULE EXAMPLE	CAPSULE SIZE	COST-IN-USE	PRODUCTION CAPACITY	PREFERRED RELEASE MECHANISM
Spray drying	Emulsions Flavours Oils	Protection against degradation / oxidation Convert liquids to powders	Biopolymers	 Matrix		n/a	Low	Continuous (2 T/h)	Hydration
Spray chilling	Organic / Inorganic salts Enzymes Flavours Functional ingredients	Improve heat stability Delay release Convert liquid hydrophilic ingredients into powders	Fat / wax	 Matrix		> 100 µm < 100 µm	(Very) low	Continuous (5 T/h)	Thermal Time Digestion Hydration
Extrusion	Volatiles Flavours Microorganisms (probiotics) Enzymes Heat-sensitive compounds	Long shelf life Protection against oxygen / water	Fat / wax Biopolymers	 Matrix		> 100 µm	Low	Continuous	Thermal Time Digestion Hydration
Fluidized bed coating	Any ingredient in powder form (pre/probiotics, enzymes, peptides, minerals, vitamins)	Considerable release properties (any kind of shell) Better protection Increase shelf life	Fat / wax Biopolymers Multi layers	 Core / shell		> 100 µm	Medium	Batchwise (1 T)	Thermal Time Digestion Hydration
Spouted bed technology	Dry and wet systems Irregular particles Probiotics Fats	Mild processing In-situ creation of spherical particles	Biopolymers	 Matrix		> 100 µm < 100 µm	Medium	(Semi-) Continuous (1T)	Thermal Time Digestion Hydration
Coacervation	Drugs Flavours / Fragrances Nutrients Vitamins Enzymes	Controlled release Bitter taste masking Better protection High payload	Biopolymers	 Core / shell		> 100 µm < 100 µm	High	Batchwise (0.5 T)	Thermal Time Digestion Mechanical

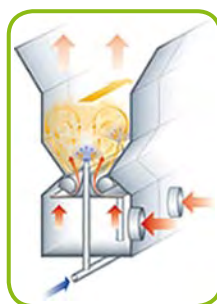
Encapsulation techniques available at Nizo

Our technology

Encapsulation is a physical process in which thin films or polymer coatings are applied to small solid particles, liquid droplets or even gas bubbles. At NIZO we offer techniques including spray drying, fluidized bed coating, extrusion, and spray chilling. Furthermore we have novel techniques available such as spouted bed coating and complex coacervation. Protection and release can be measured in house. For example gas chromatography, mass spectroscopy (GC-MS) and MS-Nose are excellently suited for measuring release properties and reaction products of encapsulated flavours.

Matrix & Core materials

To create different release characteristics NIZO food research investigates physical and chemical phenomena occurring in complex mixtures of gums, carbohydrates, proteins, fats and other components. Our experts will help you to encapsulate ingredients, such as flavours, enzymes or micro-organisms, with the right release profile.



Spouted bed coating (Glatt)

Our experience

We have successfully developed tailor-made encapsulation solutions for many of our customers. Together with the knowledge of our experts and the equipment available this experience makes NIZO an ideal partner to assist you in finding your solution.

What we offer

- Connecting your needs to our knowledge
- Innovative encapsulation techniques
- Embedded in full process from ingredients to products
- Application knowledge

About NIZO food research

NIZO food research is an independent and one of the most advanced research centres in Europe. We provide industry with solutions they require by developing and applying technologies for innovations in the areas of flavour, texture, health, food safety and process optimisation. The food-grade industrial pilot plant is used for development and testing at industrial level and is available for test productions. The NIZO application centre provides industry with facilities for product development & product oriented research.

For more information, please contact:

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