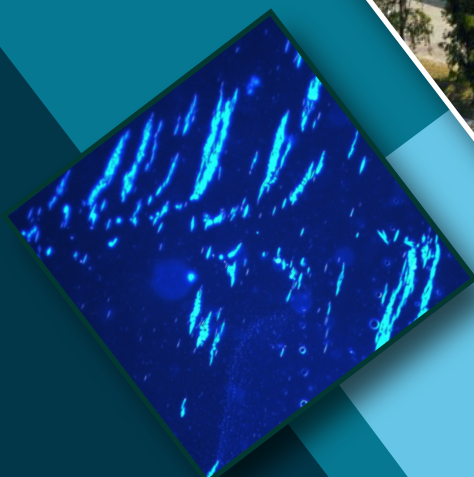


BUSINESS OPPORTUNITIES

Micro- and Nano- Encapsulation technologies

A set of techniques and strategies to encapsulate active ingredients for application in medicine, cosmetics, detergents, coatings and more



ICN2^R

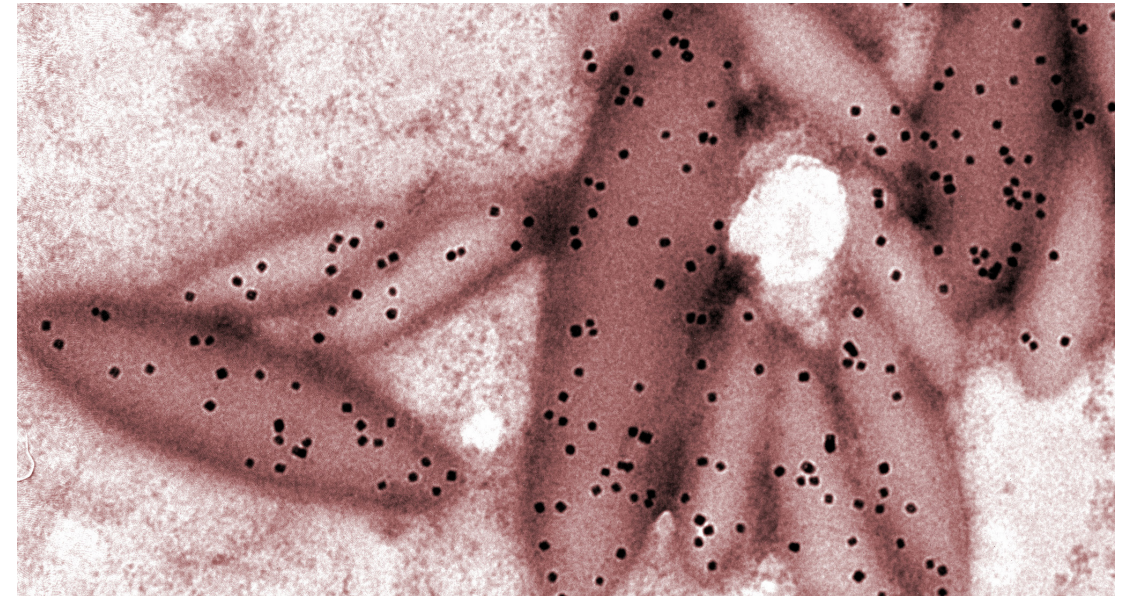
Institut Català
de Nanociència
i Nanotecnologia

APPLICATION LANDSCAPE AND NEED

Micro- and nano-encapsulation is a process that allows trapping tiny particles of solid, liquid droplets, or gas bubbles –which constitute the core– within a secondary material –called matrix or shell– to form micro- or nano-capsules. The shell isolates and protects the active ingredients (fragrances, essential oils, drugs, etc.) in the core from the surrounding environment, so

that they can be delivered under an external stimulus at a specific time and location.

Specific techniques to transfer the advanced optical properties of bulk solutions of organic molecules to solid composites, which are more relevant for practical applications and devices fabrication, can also be applied.



INNOVATION

The Catalan Institute on Nanoscience and Nanotechnology (ICN2) has devised new technologies for encapsulating active ingredients –including drugs, dyes, and fragrances– into micro- or nano-capsules to create new functional products, such as improved pharmacological formulations, microbicidal paints and slow-release laundry detergents.

The ICN2 offers solutions for a large variety of capsule materials, encapsulation methods, encapsulated substances, as well as release mechanisms and duration. Collaboration with industrial partners is welcome to develop products for specific applications.

- ▶ **Capsule materials:** liposomes, organic polymers, coacervates, sol-gels, etc.
- ▶ **Encapsulation methods:** extrusion, fluidized-bed coating, ionic gelation, interfacial / in-situ polymerization, spray-drying, solvent evaporation, etc.
- ▶ **Types of cargo:** biocides, drugs, dyes, flavours, fragrances, photochromic materials, fluorescent dyes, metal and metal-oxide nanoparticles, etc.
- ▶ **Capsules shape:** we can make capsules of different shapes (e.g. ellipsoidal) to provide them with other related properties.

- ▶ **Release mechanisms:** chemical reactivity, pH, salinity, temperature, friction / mechanical pressure, etc.
- ▶ **Transfer** of advanced optical properties of bulk solutions of organic dyes to **solid nanocomposites and inks.**
- ▶ **Release duration:** from a few hours to a few months
- ▶ **Applications:** detergents and fabric softeners, drug delivery, paints and coatings, etc.

KEY ADVANTAGES

- ▶ Full customizability of the final product.
- ▶ Experience in finding optimal combinations of active ingredient, capsule material and release conditions (time, mechanism, dosing, etc.) according to desired application.
- ▶ Assistance in end-product formulation, industrial process development and scaling-up.

BUSINESS OPPORTUNITY

We adapt our encapsulation technologies to the specific requirements of our industrial partners.

We also licence our own technologies to companies willing to adopt them.

We provide samples for their validation.



**Catalan Institute of Nanoscience
and Nanotechnology (ICN2)**

Campus de la UAB
08193 Bellaterra
Barcelona, Spain

Board of Trustees:



Business and Innovation Unit

+34 937 372 637

business.innovation@icn2.cat

**Nanostructured Functional
Materials Group**

www.icn2.cat

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