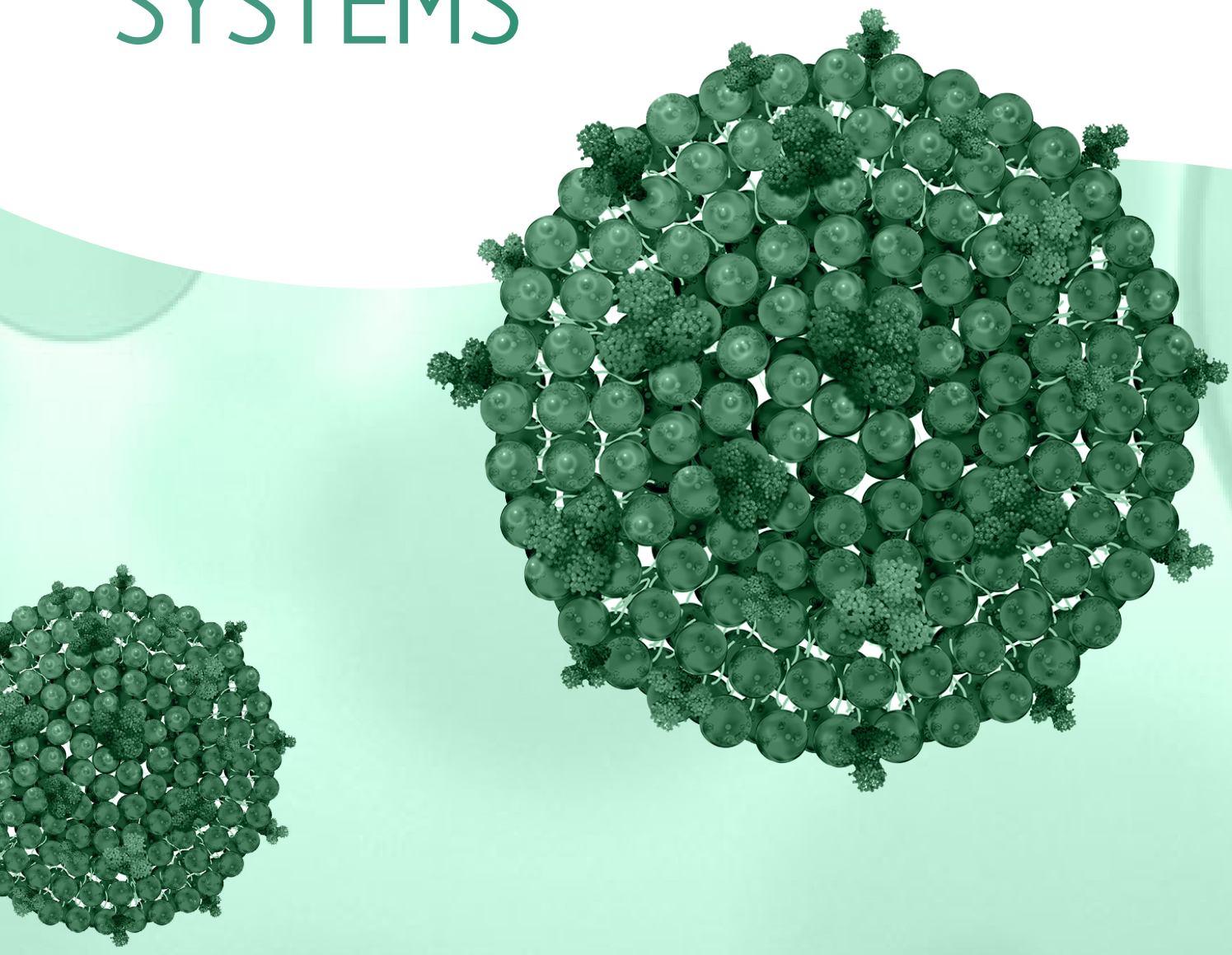
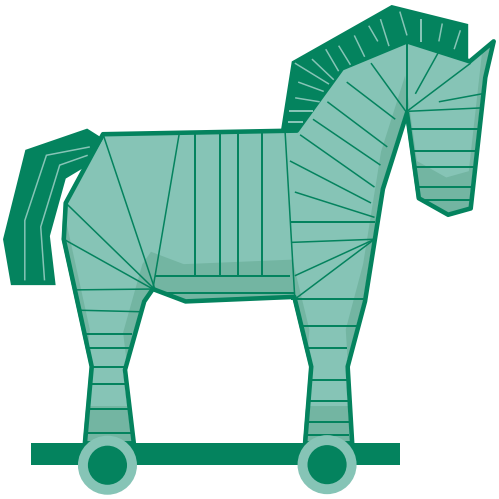
INdermal
by Nanovex Biotechnologies

EXOSOME-LIKE SYSTEMS



BROCHURE 2024

1. THE SYSTEM

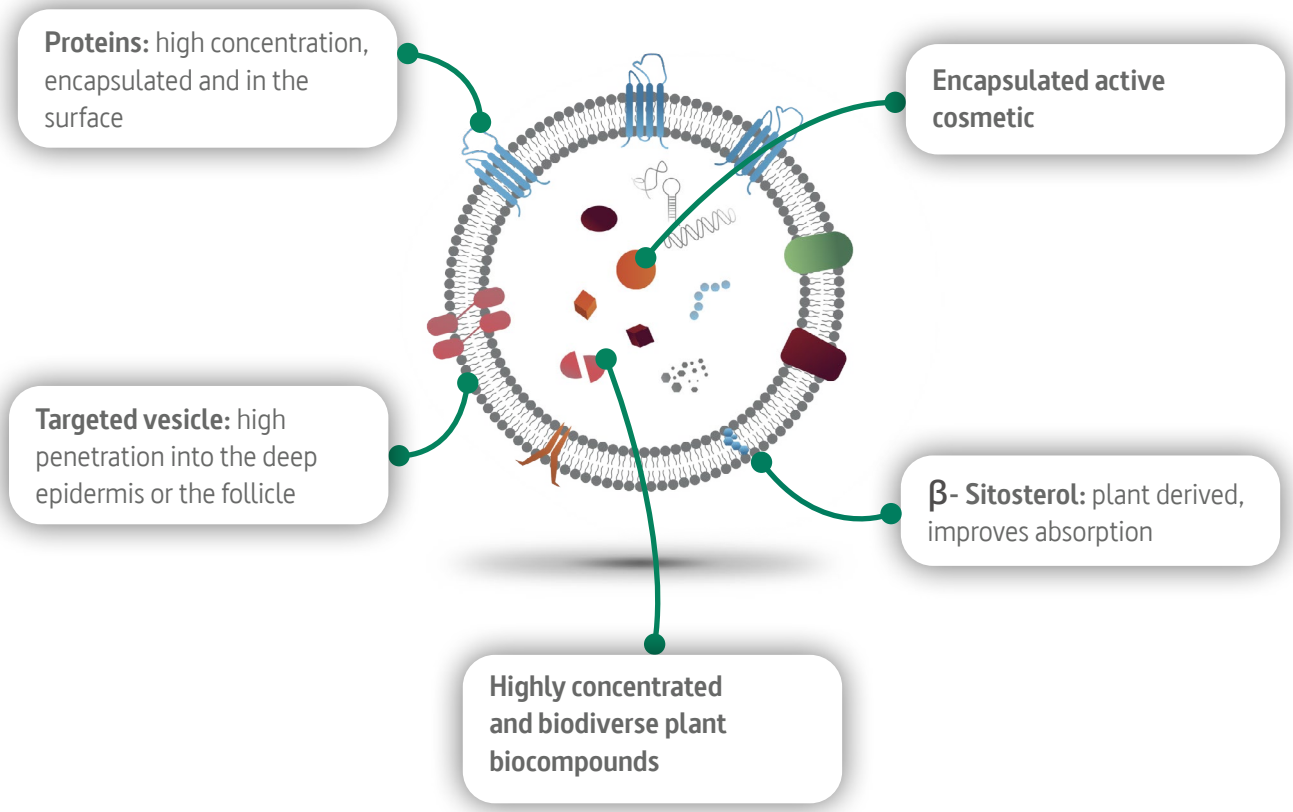


Exosomes are natural communicator **lipid vesicles** between cells which contain biocompounds such as **nucleic acids**, **proteins**, **lipids** among others. As key communicators, these exosomes can be used in cosmetics to modulate physiological processes bio-mimicking the natural process of intercellular communication and also to vectorize other compounds.

Unlock the Power of Exosome-Like Technology

The exosome-like delivery nanovesicles are designed to mimic the structure and function of natural exosomes for targeted delivery of active agents.

Biomimetic Exosomes bring the best of both worlds together. They take advantage of nature wisdom by using plant extracts rich in biocompounds such as proteins and RNA that have been used since ancient times and that have solid scientific evidence backing up their activity at a cellular level. Combining this with our latest technology and innovation in delivery systems and medical-grade manufacturing processes puts the Biomimetic Exosomes at the forefront of a cosmetic revolution.



Non-invasive penetration and specific delivery

Indermal Biomimetic Exosomes have been developed based on our vast expertise on liposome design. Deliver your active specifically at the cosmetic target required without the need of microneedles for example on the epidermis (DDS) or the follicle (FDS). Unlike traditional exosomes that require mechanical penetration via puncture, our system penetrates the skin naturally, ensuring optimal and gradual delivery without discomfort or risk.

A million times more concentration

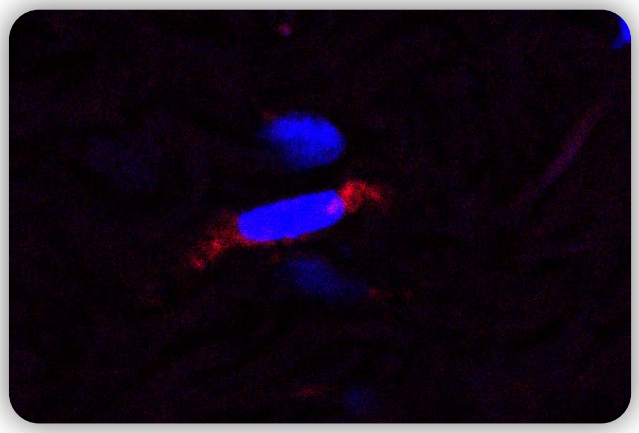
Natural exosomes can be found at concentrations as low as in the order of 10^8 exosomes/ml in serum or plasma. Indermal can produce Biomimetic Exosomes in high concentration (10^{14} exosomes/ml), a **million times more concentrated** than natural sources and so boosting their cosmetic performance.

Cellular affinity

Exosome-like vesicles show cellular affinity as can be seen in the microscopy image in the right.

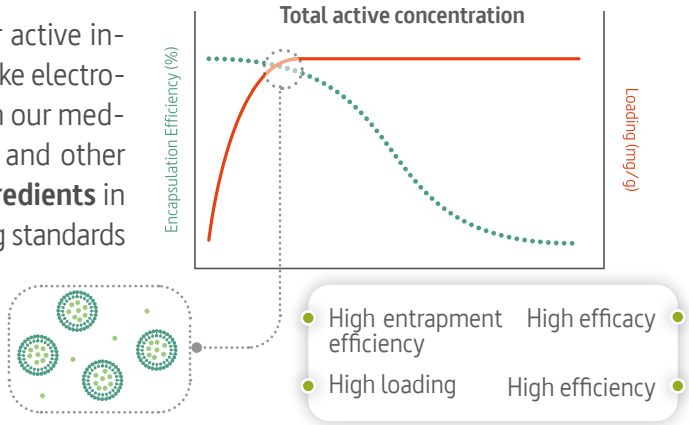
Here we can see a fibroblast where the cell nucleus is stained with DAPI (blue) and the Biomimetic Exosomes are labeled with rhodamin (red).

This image proves that the exosome-like vesicles specifically target cells acting effectively as communicators like natural exosomes.



High encapsulation efficiency

Natural exosomes can be made to encapsulate other active ingredients but it requires highly expensive techniques like electroporation that are not viable for mass production. With our medical background experience working with exosomes and other nanovehicles **we are able to encapsulate active ingredients** in the exosome-like system keeping our most demanding standards of **high entrapment and loading efficiency**.



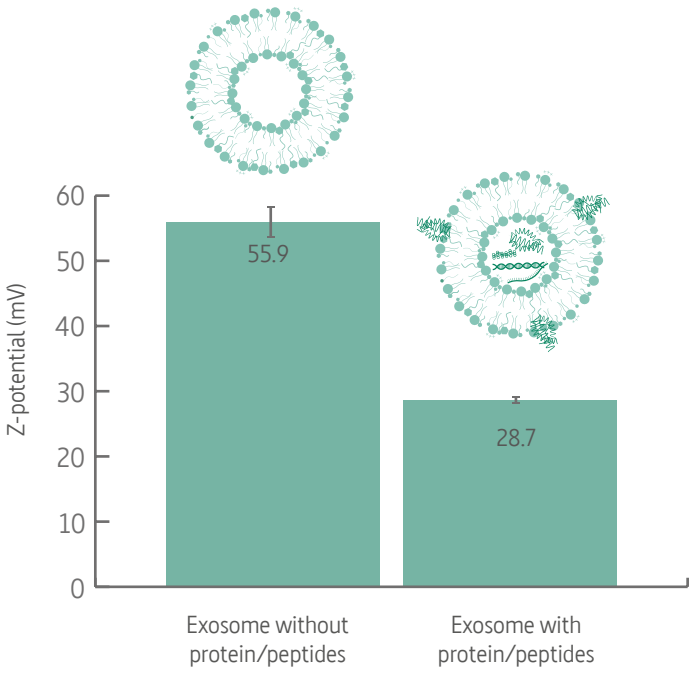
Plant inspired design

Indermal Biomimetic Exosomes are **enriched with natural plant extracts** which set them apart from other liposome systems showcasing the synergistic effects of their contents. They also feature **β-sitosterol** a phytochemical compound serving as a **vegetal equivalent to cholesterol**. It improves the absorption and bioavailability of the Biomimetic Exosomes, promotes skin health and helps cell targeting.

Surface loaded proteins

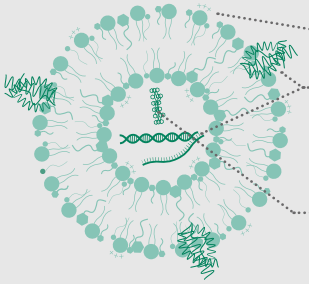
Part of the proteins and peptides contained in the exosome-like formulations are located on the surface as in nature exosomes, being able to **effectively execute their actions.**

This can be tested with the Z-potential of the vesicle. The **change in the surface Z-potential** with or without the added proteins proves that some of them are **located on the membrane of the vesicle.**



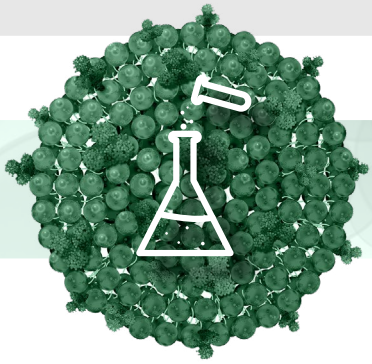
2. Custom biomimetic exosome-like products

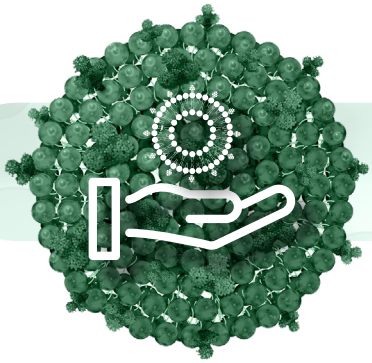
CUSTOM EXOSOMES



- Choose your target layer (DDS or FDS)
- Choose one or more plant extracts to base your exosome on (preferably ones with known proteomics and genomics to decrease variability of the productions)
- Optional: choose a mix of actives or a single active ingredient like a peptide to enhance the activity of the exosome

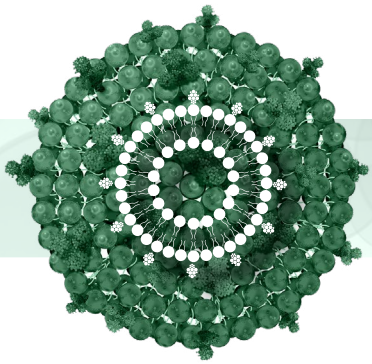
SPECIFIC ACTIVE ENCAPSULATION





UNIQUE EXOSOME DESIGN

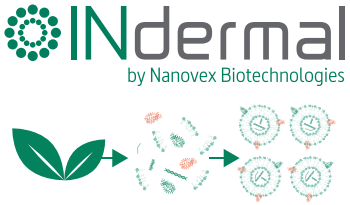
SPECIFIC ACTIVE ENCAPSULATION **IN A UNIQUE EXOSOME**



We adapt to the specific requirements of each customer

1. Free Feasibility study
2. Product development in 6-8 weeks
3. Technical and safety documents
4. First production included

3. Comparision with other similar options



	INDERMAL EXOSOME-LIKE SYSTEM	EXTRACTED NATURAL EXOSOMES (FROM PLANTS)	OTHER SYNTHETIC MADE EXOSOME-LIKE VESICLES
COMPOSITION	Inspired on plant exosome particles with β-sitosterol, targeting molecules and plant natural biocompounds	Extracted directly from plants	Plant extracts plus lecithin
SURFACE LOADED PROTEINS	✓ Proven by Z-potential	✓	✗
CONCENTRATION	High concentration: 10^{14} exosomes/ml	Low concentration 10^{8} exosomes/ml	✗
FULL CHARACTERIZATION	✓ Consistent PDI, size, pH	High variability between batches	✗
CAPABILITY TO ENCAPSULATE ACTIVES	✓	✗	✗
NON INVASIVE AND HIGHLY EFFECTIVE SKIN PENETRATION	✓	✗	✗
CUSTOMIZABLE	✓	✗	✗
CELLULAR AFFINITY	✓ Proven by microscopy	✓	✗
PRODUCTION METHODS	Medical degree 3 stage manufacturing standard	Expensive extraction methods	Mixture of ingredients

OUR DELIVERY SYSTEMS AVAILABLE

CORNEUM DELIVERY SYSTEM

The use of these superficial delivery systems substantially increases the concentration of the active ingredient in the stratum corneum, minimalizing penetration at deeper levels. This is particularly useful in avoiding unwanted effects that can be caused at this level, for example when using active ingredients with a high irritant capability, like AHA.

FOLLICULAR DELIVERY SYSTEM

The "Follicular Delivery" nanovesicles vectorise the active ingredients to the deepest areas of the hair follicle in order to have the most powerful and selective effect on the germ cells, hair bulb, dermal papilla and sebaceous gland. They are ideal for hair loss and sebum regulating products.

HAIR DELIVERY SYSTEM

The "Hair Delivery" nanovesicles are formulated with cationic phospholipids and ceramides which give them high capillary adhesion and a considerable resistance to washing and rinsing. They progressively deliver the active ingredients to the hair stem cuticle, penetrating up to the cortex of the hair medulla, particularly when treating damaged hair.

DEEP DELIVERY SYSTEM

The active ingredients encapsulated in the "Deep Delivery" systems are delivered specifically to the deepest layers of the epidermis in order to have the most precise and intense effect on the structures and cells located therein: melanocytes, Langerhans cells, keratinocytes, basal cells, Merkel cells…

INdermal
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Incorporate encapsulated active ingredients in your formulations and take your products to the next level of efficiency to surprise your customers and stand out from the competition.

CONTACT FORM

DOWNLOAD CATALOGUE

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