New challenges in cosmetic formulations: Innovative, environmentally friendly and non-toxic microparticles

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Innovative, environmentally friendly and non-toxic microparticles

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ACTUAL CHALLENGES IN COSMETIC SECTOR[1-3]

Sensorial properties

Efficacy

Naturality

Transparency

Non-toxicity

Sustainable

Eco-friendly

Microplastic free

Responsible technologies

Low energy consumption

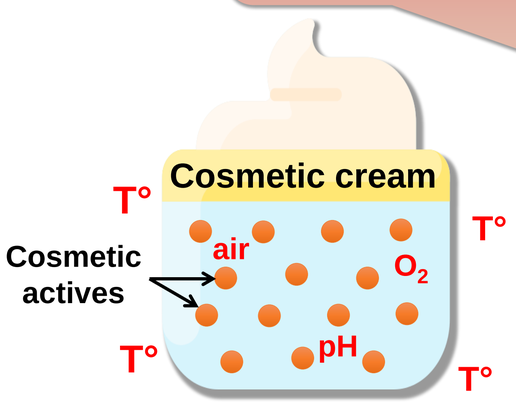
Low emissions and waste

Need of **green methods** to formulate **cosmetic products** with real **efficiency** and **good sensorial properties** using **natural and safe ingredients**

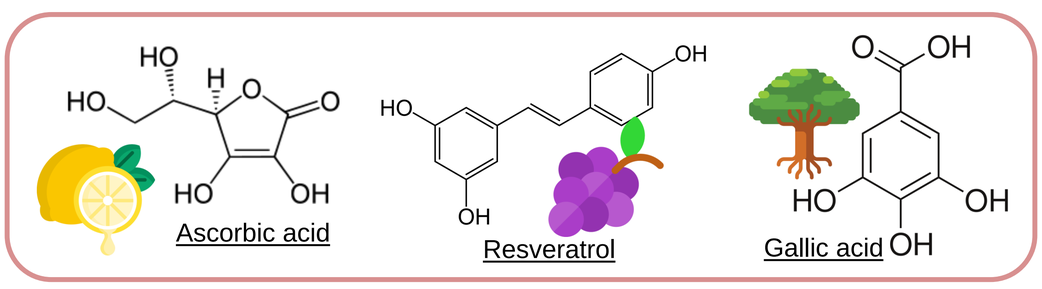
[1]Bom, S. et al. A Step Forward on Sustainability in the Cosmetics Industry: A Review. *Journal of Cleaner Production* **2019**
[2]Amberg, N.; Fogarassy, C. Green Consumer Behavior in the Cosmetics Market. *Resources* **2019**, *8*, 137
[3]Sustainability: The French Story. *Kantar Europe Sustainability Foundational Study 2021* **2021**, 47

DELIVERY SYSTEMS FOR EFFICIENT COSMETICS[4-5]

The use of cosmetic actives if **often very limited and not without risk** because of their low solubility and sensitivity to **environment** (temperature, air, O2, pH). Beyond **economic losses**, undesired reactions occuring, may represent a **high risk for the consumer**.



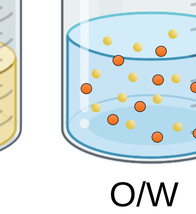
- Low efficacy
- Economic losses
- Potential risk for consumers



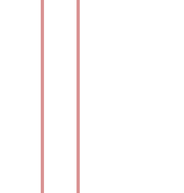
Micro/nano spheres

Micro/nano capsules

ENCAPSULATION SOLUTIONS



Liposomes



Nanostructured lipid carriers

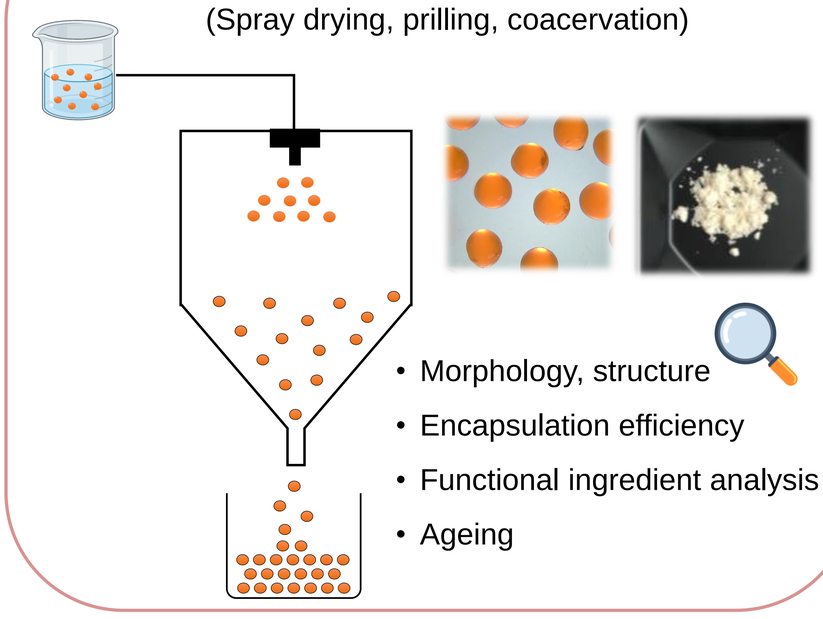
- ✓ EFFICACY
- ✓ PROTECTION
- ✓ CONTROLLED DELIVERY
- ✓ SKIN PENETRATION

Encapsulation → alternative to improve actives **efficacy and stability**

[4]Casanova, F.; Santos, L. Encapsulation of Cosmetic Active Ingredients for Topical Application – a Review. *Journal of Microencapsulation* **2016**
[5]Costa, R.; Santos, L. Delivery Systems for Cosmetics - From Manufacturing to the Skin of Natural Antioxidants. *Powder Technology* **2017**

CHALLENGES OF OUR CAPS4SKIN PROJECT

Microencapsulation of cosmetic actives
(Spray drying, prilling, coacervation)



- Morphology, structure
- Encapsulation efficiency
- Functional ingredient analysis
- Ageing

Compatibility of microparticles with cosmetic emulsions

W/O O/W

- Interactions with cosmetic systems
- Morphology / integrity of microcapsules
- Functional ingredient analysis
- Stability, ageing

Release study, sensory & efficacy properties on non biological skin

- Mechanical action and shearing effect
- *In vitro* release study
- Sensory analysis

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