

caps<sup>il</sup>  
food tech by Prodalim

# Bringing the future of Nano Emulsion Technology to Your Product



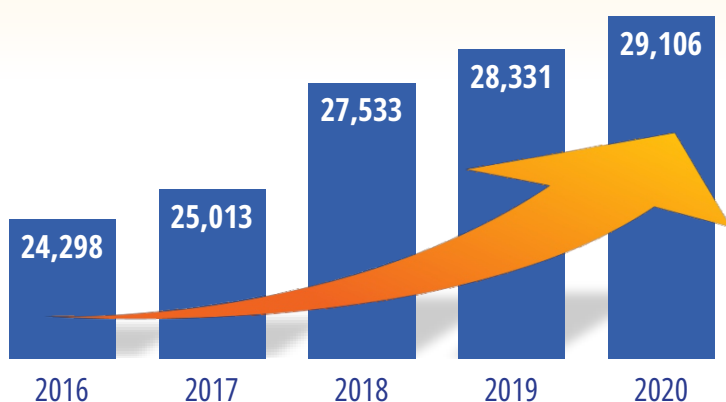
# Recent changes in the food industry

Recent decades have seen significant changes in the food, beverage and dietary supplement industries. On the one hand, consumers today are looking for foods and beverages that deliver more than just nutrition and functionality.

On the other hand, the dietary supplement industry suffers from "pill fatigue" where consumers seek solutions for their health ingredients in formats other than capsules, softgels and tablets. These two trends meet where fortifies and functional foods and beverages are on the rise.

## Increasing consumer demand for functional and healthy foods and beverages

FMCG NPL with functional claims\*



Many ingredients normally considered as "healthy ingredients" come from the lipid family. Adding these oily ingredients – like omega-3 or MCT; fat soluble vitamins like A,D,E and K – is extremely challenging, as oil and water do not mix.

**Capsoil's game changing technology can help!  
Capsoil Technologies developed an innovative  
production processes of ultra-fine powders  
out of natural oils.**

\*Mintel GNPD

# Capsoil's unique technology

Capsoil developed a technology that allows conversion of any oil or lipophilic – oil-loving – ingredient into a water-soluble powder. Capsoil powders form a complete self-emulsifying nano-emulsion system and have many benefits, including but not limited, the following:

- 🌿 **Self emulsifying nano-emulsion** leading to water solubility
- 🌿 **Better bioavailability** (bioaccessibility & absorption)
- 🌿 **High load of oil** in powder
- 🌿 **Clean production process** – no use of solvents or heat also allows to maintain starting material nutrient content





## Entering oils

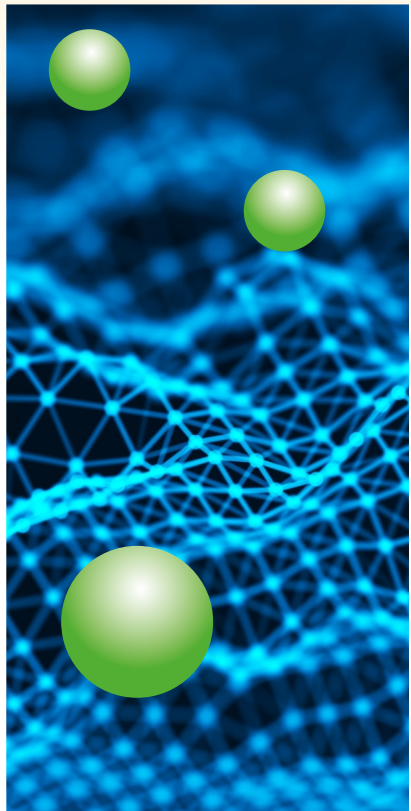
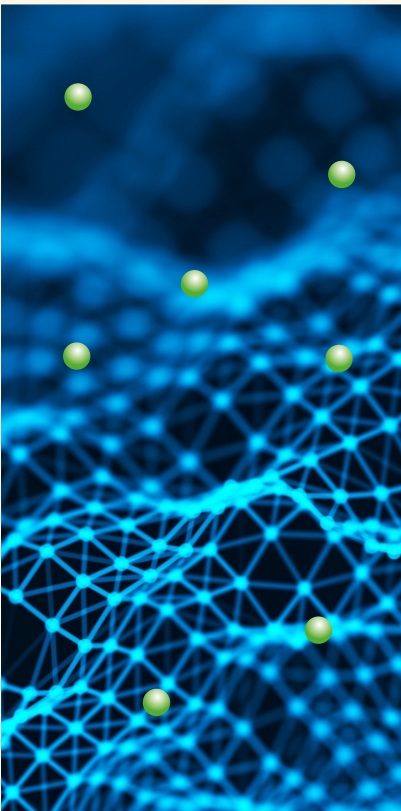




# Self-emulsifying nano emulsion

Our powders are built as a complete system; you do not need to add anything to the powders in order to make them soluble. The emulsion formed is stable, with particle size of 150-200nm. Capsoil powders self-emulsify even in cold water!

-  **Particles are built with emulsifier at nano level NOT at the formulation level**
-  **Capsoil powders require no addition emulsifiers**
-  **The powder is easily self emulsified even in cold water**
-  **Each particle is a nano-delivery system**



## Capsoil vs. regular emulsion



**Capsoil  
Nano-Emulsion**



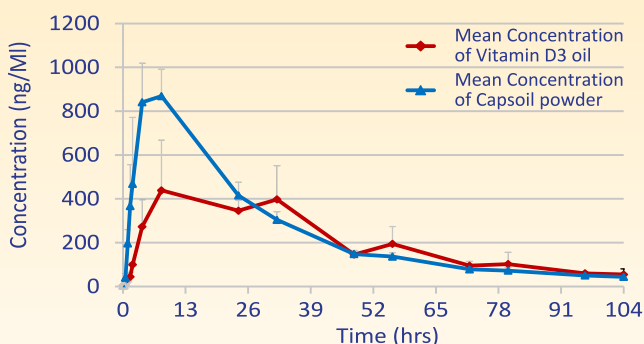
**Regular emulsion**



## Better Bioavailability

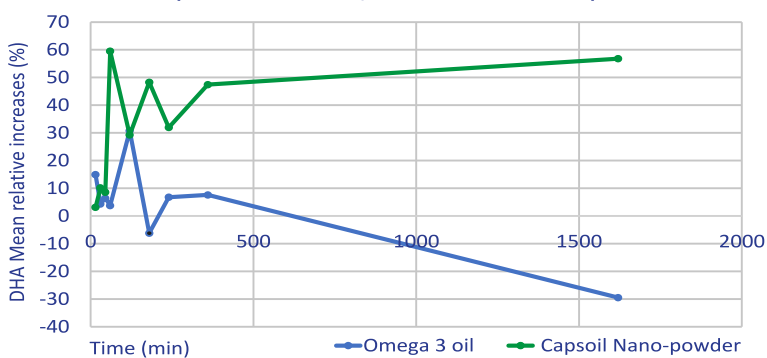
Better bioavailability is achieved because of the small particle size of the emulsions. The smaller the particle, the larger the surface area, making the oil more available to the biological system. The improved bioavailability of Capsoil powders was demonstrated for two ingredients – vitamin D and omega-3. In the studies oil is converted to powder and bioavailability is tested vs. the starting oily material.

**Mean Plasma Concentration of Vitamin D3 Following Capsoil Powder Intake**



- 🌿 Bioavailability of Capsoil's Vitamin D3 was tested in a pre-clinical study
- 🌿 Capsoil's vitamin D3 powder was compared to a vitamin D3 oil
- 🌿 All measures were improved following intake of Capsoil's product including  $C_{max}$ ,  $T_{max}$  and AUC

**DHA Increase Following Capsoil Powder Intake (Percent increase / initial concentration)**



- 🌿 Each group of rats was administered with the same amount of DHA in a single dose of oil or powder
- 🌿  $C_{max}$  in plasma is 46% higher in the powder vs. the oil
- 🌿  $T_{max}$  in plasma is 45 minutes for the powder, compared to 90 minutes for the oil
- 🌿 DHA blood levels were kept high up to 24 hours after powder digestion



## High load of oil

Unlike "regular" powders where oil is poured over a carrier, limiting the oil content in the powder, Capsoil process starts directly from the oil. This way, Capsoil powders can have up to 60% oil load, much higher than the 12-20% load of conventional powders. Moreover, unlike conventional powders, where the oil is exposed to the environment, Capsoil powder uses different technology where the oils are less exposed, making Capsoil powders also less sticky and more flowable.

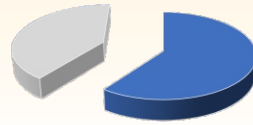
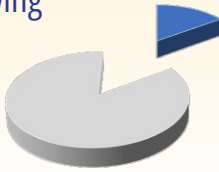
### Existing old tech:

- Oil absorption into cracks
- 12-20% oil in powder
- Particle size: 5-7 micron
- Sometimes sticky and not free flowing

### Capsoil powder:

- Encapsulates the nano-drops
- Up to 60% oil in powder
- Particle size: 150-200nm
- Free flowing dry powder

12-20%



60%



## Clean production process

We do not use any solvents, chemicals or enzymes, all reaction takes place at room temperature, making our process clean with a low carbon footprint. Also, the composition of the starting oil is the same in the finished powder – what you put in you get at the end!



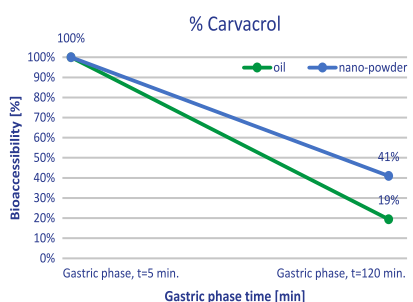
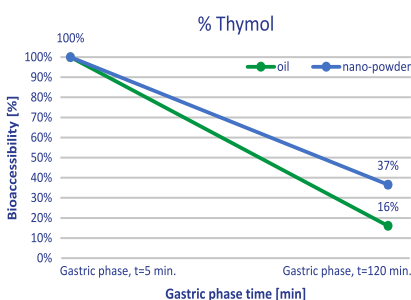
No solvents



Cold process (low carbon footprint)



Process allows for minimal loss of nutrients



# What can you do with Capsoil powders?

Capsoil powders allows you to quickly innovate your products with no prolonged development steps. You can now easily enrich you water with vitamin D, add vitamins or MCT to your coffee pods, make your tea functional or add functionality to your food product, also improving its image in the eyes of the consumers.

If you are in the dietary supplement industry, you can now improve your offering to consumers by adding capsules and tablets to your omega-3 softgel offering, create nano formulations, new mixes not possible before and many more options.



Open your imagination, we will be there to help you develop the next generation of your product!

# Capsoil's unique Game Changing Technology convert any oil based or lipophilic substance into water-soluble powder

- 🌿 Self emulsifying nano-emulsion leading to water solubility
- 🌿 Better bioavailability (bioaccessibility & absorption)
- 🌿 High load of oil in powder
- 🌿 Clean label – no use of solvents or heat also allows to maintain starting material nutrient content



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