



PATENTS PENDING

NUREVELATION, LLC

**JoChe: Natural Nanoparticle
Encapsulation Technology Improves
the Bioavailability of Nutraceuticals
and Cannabinoids**

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The JoChe Process Creates All-natural Nanoparticles

JoChe is a revolutionary encapsulation technology which solves these shortcomings by creating self-assembling nanoparticles whose scaffold is composed of natural and inexpensive ingredients. This nanotechnology is capable of encapsulating a variety of nutraceuticals and cannabinoids into nanoparticles with sizes as small as 1nm. The **JoChe** Process helps increase the bioavailability of encapsulated compounds in colloidal solutions, results in a faster onset of action, masks odor and flavor, paving the way for a myriad of applications.

The **JoChe** Process can encapsulate a wide variety of compounds (e.g. nutraceuticals, cannabinoids, pharmaceuticals) into nanoparticles using all-natural ingredients with an inexpensive and straightforward procedure. This proprietary encapsulation process does not alter the chemical structure of the cargo, as confirmed by NMR analysis. Furthermore, the resulting powder can be easily stored, packaged, and transported, having a shelf-life stability of over 18 months (based on real-time testing with LC-MS and NMR). The **JoChe** Nanoparticles also provide unique properties to the encapsulated cargo material, including taste-masking, heat stability and higher water solubility.

The **JoChe** Nanoparticle size depends on the nature of the encapsulated compound and on the steps of the process itself. Dynamic light scattering experiments and transmission electron microscopy has shown that the nanoparticles distribute among three populations of roughly 1-20, 50-200 and 500-1000 nm (Figure 1).

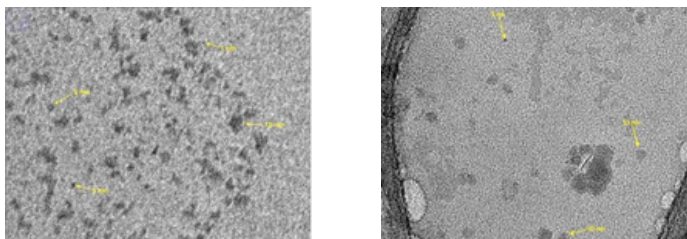


Figure 1. TEM images of **JoChe** nanoparticles encapsulating CBD (left) and Turmeric (right).

The JoChe Process Creates Superior Nanoparticles

JoChe is a simple process which uses ALL-natural elements to create self-assembling nanoparticles, as small as one nanometer. The technology can encapsulate a variety of nutraceuticals, cannabinoids and pharmaceuticals, either individually or in custom molecular cocktails. The **JoChe** Process solves common problems observed with cannabinoids and other nutraceuticals, such as improving solubility, increasing shelf-life stability, hiding taste and odor, and decreasing the cost of manufacturing.

Nutraceuticals and cannabinoids are revolutionizing the food, beverage, and health industries. However, significant challenges remain to optimize the bioavailability of these compounds. Their low solubility creates a major obstacle to fully exploiting their potential in beverages and other consumables. While nano encapsulation into colloidal suspensions improves cannabinoid solubility and therefore their effectiveness, current nano emulsions rely on emulsifiers and non-natural compounds that increase production costs and may have undesired side effects. NuRevelation's **JoChe** Process - a revolutionary technology - creates nanosized particles composed of natural and inexpensive ingredients. The **JoChe** Process increases the bioavailability of nutraceuticals and cannabinoids in colloidal solutions and also masks odor and flavor without the drawbacks of existing nanotechnology solutions.

Solubilizing Nutraceuticals and Cannabinoids is Challenging

Global use of nutraceuticals and cannabinoids in the food, dietary supplement, and beverage industries has increased in recent years. These compounds have demonstrated health-promoting effects, which include anticancer, cardioprotective, analgesic, anti-inflammatory, anxiolytic as well as other properties [1-4]. Nevertheless, due to their low solubility, they suffer from low bioavailability and in some instances caused toxicity [5-7]. Because these compounds naturally occur in an oily state, cannabinoids are typically prepared in the form of emulsions and added to foods and drinks [8-10]. However, such preparations also require additives such as surfactants in the form of polysaccharides, proteins and/or phospholipids which increases production costs. To unleash the potential of cannabinoids and nutraceuticals, which effectively expands their application, it is imperative to find safer and inexpensive ways to increase their concentration in consumables and subsequently their bioavailability.

Nano Emulsions are NOT the Solution

The encapsulation of nutraceuticals and cannabinoids in nanoparticles enhances their bioavailability [11]. Nanoparticles (usually defined as 1-100 nanometers in diameter), not only improve solubility, but also enhance transport, targeting, and distribution in the body [12, 13]. Nano Emulsions are metastable dispersions of nanoscale droplets of one fluid within another fluid [14]. Despite the wide utility of emulsions and nanoparticles in nutraceutical and pharmaceutical formulations, emulsions and certain nanoconjugate formulations still suffer significant setbacks in their application. Among the concerns raised about emulsions are questions related to their stability and shelf-life, leading to issues with packaging and transportation, resulting in higher production cost. Higher production costs are similarly associated with the use of nanoconjugates and other nanotechnological strategies. In addition, the use of metals and non-natural components which are required for the production and/or stabilization of nanodelivery technologies can cause harmful side effects [15, 16]. Thus, there is a need for a more effective nanoparticle delivery system that is safer, cheaper, and eliminates the problems associated with the current formulations being applied in the industry.

The Benefits of the JoChe Process include:

- Converts oil-based compounds into a water-soluble powder
- Keeps cargo compound composition 100% pure
- Masks taste and odor of cargo compounds
- Achieves shelf-life stability at room temperature for 18+ months
(Tested with CBD)
- Prevents adherence to sides of aluminum cans

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