

NUREVELATION, LLC

PATENTS PENDING



JOCHE - BREAKTHROUGH ENCAPSULATION TECHNOLOGY FOR THE EFFECTIVE DELIVERY OF NUTRACEUTICALS

*JoChe is a revolutionary **Clean Nano-Encapsulation Technology** that improves solubility, increases bioavailability, extends shelf-life and masks taste and odor of nutraceuticals through a proprietary process that uses **ALL-NATURAL GRAS** ingredients to produce a cost-effective nanoparticle formulation with particles as small as 1 nanometer.*

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Low Solubility: A Major Challenge for Nutraceuticals

Global use of nutraceuticals in the food, dietary supplement, and beverage industries has increased in recent years. Recent studies have demonstrated numerous health-promoting effects of nutraceuticals, including lowering of cholesterol, cardioprotection, neuroprotection, antioxidation, immune modulation, anti-inflammation, as well as anti-cancer, antibacterial, and antiseptic properties [1-7]. However, nutraceuticals generally suffer from low solubility and are often difficult to incorporate into beverage and food products. Moreover, the poor solubility affects their bioavailability and, as a result, nutraceuticals need to be used at high dosages to be effective [8-10]. This creates significant obstacles in their administration, compounded by their often unpleasant taste and odor. Examples of challenging nutraceuticals include curcumin, collagen and vitamin B12 among others, whose health-promoting effects have not been fully utilized due to the lack of effective technological solutions [11-13].

Nanoemulsions are not the Solution

Nanoemulsions are widely utilized to solubilize nutraceuticals and improve their bioavailability in food, supplements, and beverages. As a meta-stable dispersion of nanoscale droplets, nanoemulsions are somewhat effective, though their production requires the use of harmful chemicals, heavy metals, surfactants, and other synthetic compounds [14-16]. In addition to potential safety concerns, nanoemulsions suffer from poor stability, variable shelf-life, issues with packaging, and challenging transportation while requiring a complex and costly production process. Thus, there is a need for a more effective nanoparticle delivery system that is safe, cost-effective, and eliminates the problems associated with current formulations being utilized in the industry.

All-Natural JoChe Nanoparticles Improve Solubility

JoChe is a revolutionary encapsulation technology which solves these shortcomings by creating self-assembling nanoparticles whose scaffold is composed of all-natural and inexpensive ingredients. The JoChe Process increases the solubility of nutraceuticals in colloidal solutions - e.g., a 185-fold increase in water solubility was measured in the case of encapsulated CBD (*Figure 1*). This proprietary encapsulation process does not alter the chemical structure of the cargo, as confirmed by nuclear magnetic resonance analysis. Furthermore, the resulting powder can be easily stored, packaged, and transported. With all these characteristics, the JoChe process offers a cost-effective solution to the low solubility problem faced by the nutraceutical industry.



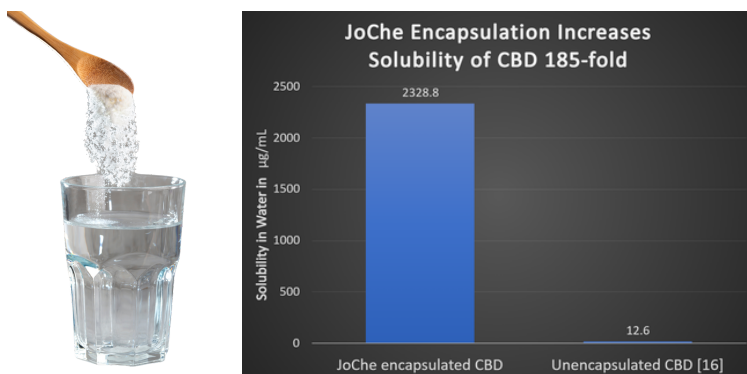


Figure 1. Solubility comparison between a JoChe encapsulated and an unencapsulated cannabinoid. Values determined by HPLC-MS and reported in µg/mL.

The Small Size of JoChe Nanoparticles Improves Bioavailability

Nanoparticles not only improve solubility but also enhance transport, targeting, and distribution in the body [17-19]. The JoChe process can encapsulate a variety of nutraceuticals – as single cargo or as molecular cocktails containing different compound combinations – into nanoparticles with sizes as small as 1 nanometer, which can be visualized by transmission electron microscopy (*Figure 2*). In solution, JoChe creates a dynamic system in which nanoparticles aggregate and disaggregate into structures ranging from 1 to 50 nanometers, depending on the properties of the encapsulated compound and the production conditions (temperature, solvent, concentration).

The extremely small size of nanoparticles enhances the bioavailability of orally administered encapsulated compounds by increasing the rate of absorption along the gastrointestinal tract [20]. The JoChe nanoparticles thus benefit customers by providing improved bioavailability, increased absorption, and a faster onset time for encapsulated cannabinoids [21,22].

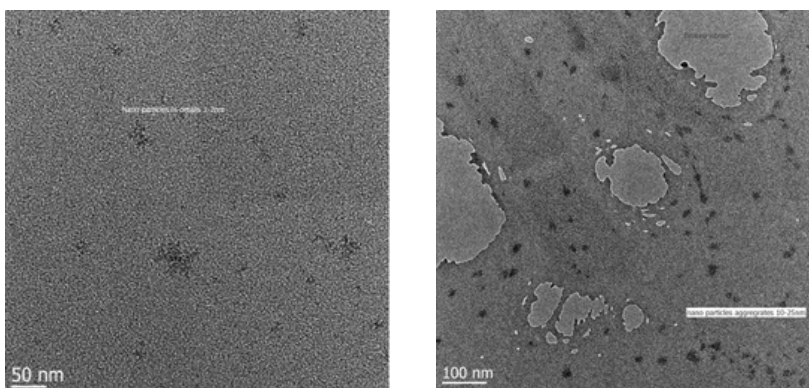


Figure 2. TEM images of **JoChe** nanoparticles encapsulating cannabinoid. *Left:* Sub-50 nm particles and aggregates are visible as dark spots. *Right:* Magnification showing 1-2 nm particles.

JoChe Encapsulation Masks Unpleasant Odors and Unpalatable Taste

Flavor and odor, which are inextricably linked, play a vital role in consumer acceptance. Hence, the unpalatable taste and displeasing odor of numerous nutraceuticals makes them difficult to sell without additives, including dyes and flavoring excipients, that attempt to make the product more appealing [23]. The JoChe encapsulation process not only improves the solubility of the nutraceutical but is also a superb taste and odor masker. Internal testing data show that typically repugnant nutraceuticals - including fish oil, sea moss, glutathione, and B12 - can be completely odor and taste masked when encapsulated via JoChe. The ability for JoChe to mask the flavor and odor of nutraceuticals without using excipients can greatly improve product appeal, consumer compliance, and manufacturing efficiencies.

The JoChe process can Extend the Shelf Life of Encapsulated Ingredients

Akin to pharmaceuticals, nutraceuticals are only effective if their biologically active ingredients remain stable during storage. Time, temperature, moisture, and oxygen levels all impact the stability of the active ingredients in nutraceuticals and any degradation results in consumers receiving inconsistent or subpar dosages [24]. Although there are several rudimentary techniques that improve stability - including storage at low temperatures, dehydration, removal of oxygen - cost becomes a significant concern. The JoChe encapsulation process can be used to significantly extend the shelf life of biologically active ingredients at standard temperatures and atmosphere. For example, JoChe encapsulated cannabidiol (CBD) was completely stable at room temperature over a period of 18 months, compared to unencapsulated CBD which is generally considered stable for up to 6 months [25].

In Summary, The Benefits Of The JoChe Process Include:

- Converting Oil-Based , Poorly Soluble Compounds into a Water-Soluble Powder
- Taste and Odor Masking of Cargo Compounds
- Extend Shelf-Life Stability at Room Temperature for 18+ Months
(Based Upon Real Time Testing with CBD)
- Thermostable Up to 500 Degrees Fahrenheit
- Creating Molecular Cocktails with Two or More Compounds
- Keeping Cargo Compound Composition 100% Pure



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Appendix

Sample List of Nutraceuticals Successfully JoChe Encapsulated

- Aloe Vera
- Apple Cider Vinegar
- Ashwaghandha
- Beta Carotene
- Black Seed Oil
- Calcium Citrate
- Calcium Lactate
- Ceylon Cinnamon
- Chamomile Extract
- Chondroitin
- CLA (Conjugated Linoleic Acid)
- CoEnzyme Q10
- Collagen
- Cordyceps
- Creatine
- Curcumin
- Echinecea
- Enzogenol Tree Bark
- Ferrous Fumarate
- Folic Acid (Vitamin B9)
- Garcinia Cambogia
- Ginger Root Extract
- Gingko Biloba
- Glucosamine
- Glutathione
- Guarana Seed Powder
- Horny Goat Weed
- Inulin
- Iron
- Lion's Mane
- Lutein
- Kratom
- Maca
- Magnesium Oxide
- Melatonin
- Milk Thistle
- MSM
- Moringa
- Passion Flower Extract
- Peppermint Oil
- Pyridoxine (Vitamin B6)
- Reishi Mushroom Powder
- Rhodiola Extract
- Riboflavin (Vitamin B2)
- Sea Moss
- Taurine
- Thiamine (B1)
- Turmeric
- L-Arginine
- L-Carnitine
- L-Theanine
- L-Thyroxine
- Valerian Root
- Vitamin A
- Vitamin B12
- Vitamin D3
- Vitamin E
- Yohimbe Extract
- Zeaxanthin
- Zinc Oxide



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www.nurevelation.com or

Call us at 833.BYJOICHE (295-6243).

You can also email us at info@nurevelation.com