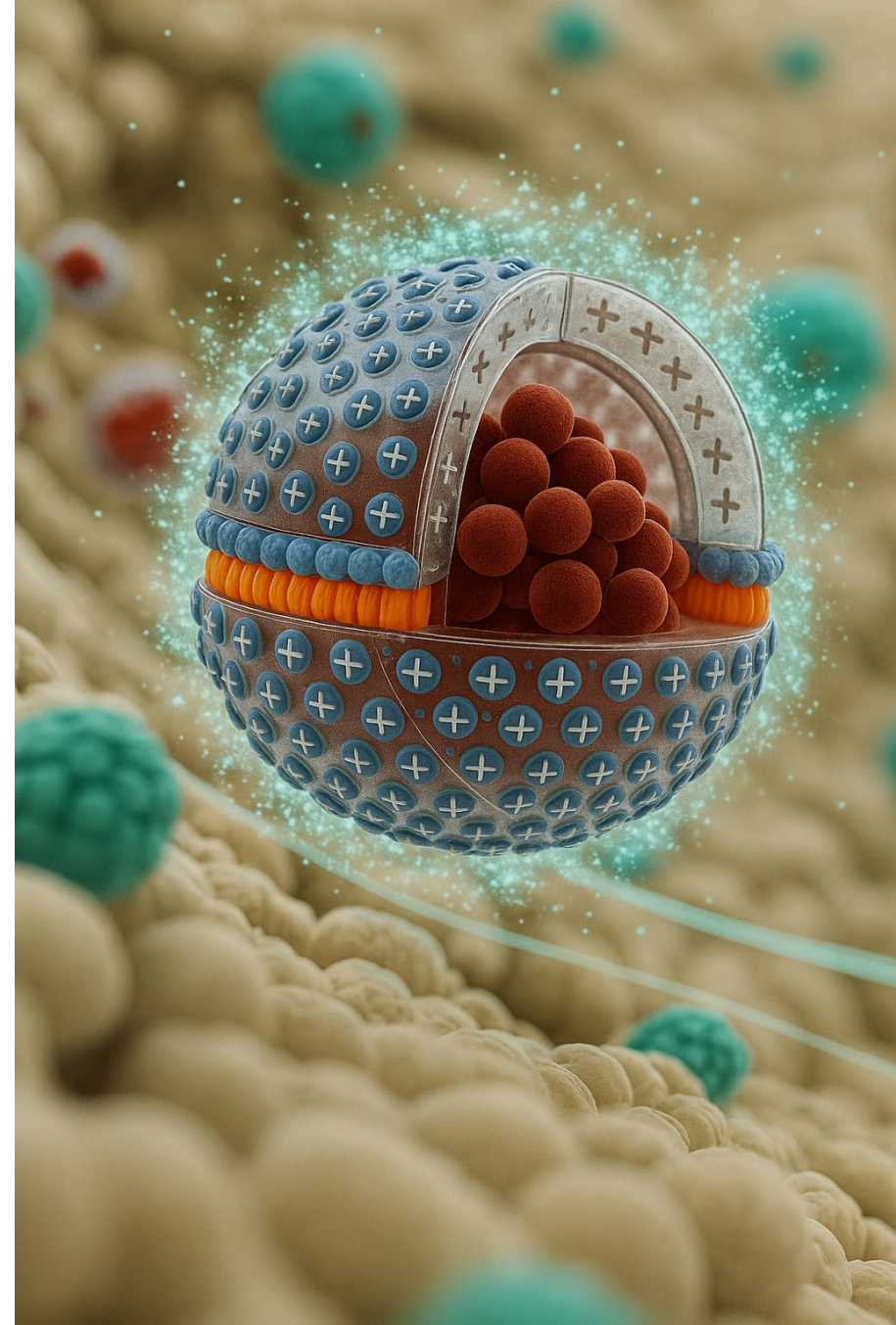


Phytosome Quantum Nano Sphere (PQNS) for Advanced Bioactive Delivery

Next-generation vesicle system for minerals, vitamins, and botanicals.

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 QuanticSphere™



Abstract

QuanticSphere™ Phytosome Quantum Nano Sphere (PQNS) represents a next-generation delivery system engineered to overcome the limitations of conventional mineral and nutraceutical supplementation. By utilizing cationic phospholipid vesicular technology, PQNS enhances solubility, bioavailability, and stability of bioactive compounds while reducing gastrointestinal side effects. This document provides a technical, clinical, and comparative overview of PQNS technology and its applications.

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Crassula Pharmaceuticals Pvt. Ltd. Date: August 2025

Introduction

The limited absorption and instability of bioactive supplements in the gastrointestinal tract have long presented challenges in nutrition science. Conventional formulations often fail to achieve optimal bioavailability, resulting in much reduced physiological effectiveness. To address these limitations, [QuanticSphere™](#) introduces a [transformative delivery strategy](#) based on cationic phospholipid vesicular technology.

The QuanticSphere™ Phytosome Quantum Nano Sphere (PQNS) is a cutting-edge system of spherical vesicles composed of one or more phospholipid bilayers. These vesicles are engineered to encapsulate mineral compounds and bioactive agents, protecting them from enzymatic degradation and acidic hydrolysis thereby significantly improving solubility and absorption. By mimicking the structural and functional characteristics of cellular membranes, PQNS facilitates efficient cellular penetration and intracellular delivery.

Superior Bioavailability

Superior Bioavailability

- **Enhanced Solubility & Stability:** Encapsulation improves dissolution of poorly soluble nutrients while shielding them from degradation.
- **Targeted Delivery:** Surface modification with ligands or antibodies allows selective interaction with tissues or cells.
- **Gut-Friendly Profile:** The vesicular barrier minimizes direct ionic contact with the intestinal lining, thereby reducing irritation and digestive side effects.

Facilitated Cellular Uptake with QuanticSphere™

- **Direct Intracellular Delivery:** Vesicles transport bioactive agents directly into the cytoplasm, bypassing conventional barriers.
- **Controlled & Sustained Release:** Designed for gradual release, maintaining steady nutrient levels in the body and reducing dosing frequency.



Clinical Applications

1

Nutrient Deficiencies

QuanticSphere™ is highly effective for the rapid replenishment of nutrients, such as **Minerals** (iron, magnesium, zinc, calcium), **Vitamins** (B12, folate, D, K2, A, E), **Botanicals** (curcumin, resveratrol, quercetin), and **Bioactives** (omega-3 EPA/DHA, CoQ10, alpha-lipoic acid, glutathione).

2

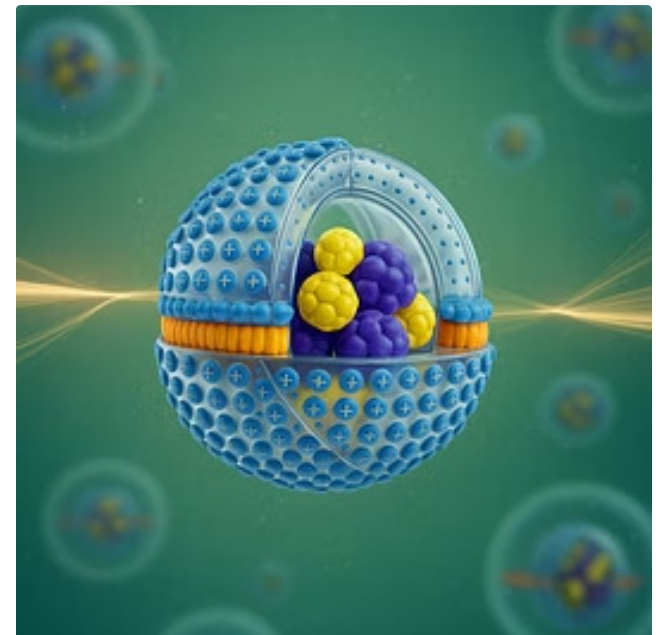
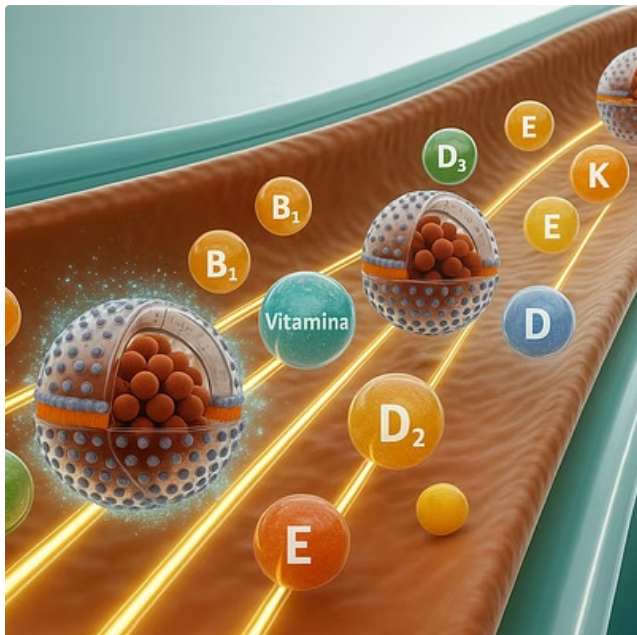
Chronic Conditions

QuanticSphere™ system is beneficial for individuals with impaired nutrient absorption (e.g., celiac disease, inflammatory bowel disease).

3

Synergistic Combination Therapy

QuanticSphere™ allows the co-encapsulation of multiple supplements (e.g., curcumin + resveratrol, vitamin D + K2), which enable multi-targeted therapy for inflammation, metabolic disorders, and cardiovascular protection.





Conclusion

QuanticSphere™ redefines the standard of mineral, vitamin, and botanical supplementation. Through Phytosome Quantum Nano Sphere (PQNS) technology, it integrates protection, programmability, and precision delivery into a robust platform. By enhancing absorption, minimizing side effects, and enabling lower effective doses, QuanticSphere™ establishes itself as a superior next-generation solution for both nutritional and clinical applications.

Appendix A: Ingredients with Low Bioavailability

Moderate= 20-50%, Low= 10-20%, Very Low= <10%

Vitamins

Low Bioavailability

Vitamin A (β -carotene)

Moderate Bioavailability

Vitamin E (α -Tocopherol), Vitamin B12, Vitamin K (K1/K2)

Minerals

Low Bioavailability

Iron

Moderate Bioavailability

Calcium, Zinc, Magnesium

Botanicals

Very Low Bioavailability

Black Cohosh, Cranberry (PACs), Curcumin, Damiana, Ginseng, Saffron, Silymarin (Milk Thistle), Boswellia (AKBA), Resveratrol, Quercetin, Green Tea (EGCG), Elderberry, Lion's Mane Mushroom

Low Bioavailability

Ashwagandha, Saw Palmetto, Rhodiola, Echinacea, Evening Primrose, Fenugreek, Ginkgo Biloba, Hops, Garlic (allicin)

Bioactives

Very Low Bioavailability

CoQ10, Alpha Lipoic Acid, Lutein, Zeaxanthin, Astaxanthin

Low Bioavailability

Glutathione, Curcuminoids, Berberine

Moderate Bioavailability

Resveratrol, Quercetin, EGCG (from Green Tea), Sulforaphane (from Broccoli)

Appendix B:

Comparative Table: PQNS vs. Liposomes vs. Conventional Supplements

Feature / Attribute	PQNS (QuanticSphere™)	Liposomes	Conventional Supplements
Bioavailability	Very high (programmable release, receptor-mediated uptake, improved solubility)	Moderate (variable absorption, depends on stability and size)	Low (often limited solubility and poor absorption)
Stability	Superior protection against gastric acidity & enzymatic degradation	Moderate stability, prone to oxidation or fusion	Poor stability; rapid degradation in GI tract
Precision Delivery	Targeted delivery possible (ligand/antibody modification, direct intracellular transport)	Limited targeting, mostly passive diffusion	No targeting; relies on bulk absorption
Gut Tolerance	Gut-friendly (reduced irritation due to protective bilayer)	Can cause mild GI discomfort at high doses	Frequently associated with irritation (e.g., iron salts, high-dose minerals)
Dose Efficiency	Requires smaller doses due to superior absorption & sustained release	Moderate; higher doses often required	High doses required to compensate for low absorption
Programmability	Fully programmable (sustained release, co-encapsulation for synergy)	Limited control over release kinetics	None; immediate release only
Synergistic Therapy	Enables co-encapsulation (e.g., Vitamin D + K2, Curcumin + Resveratrol)	Possible but less efficient	Not feasible; separate products needed
Clinical Advantage	Next-generation platform: protection, programmability, precision	Established but less versatile	Traditional; limited efficacy

**“Science inside, smart delivery, complete protection,
real results.”**

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