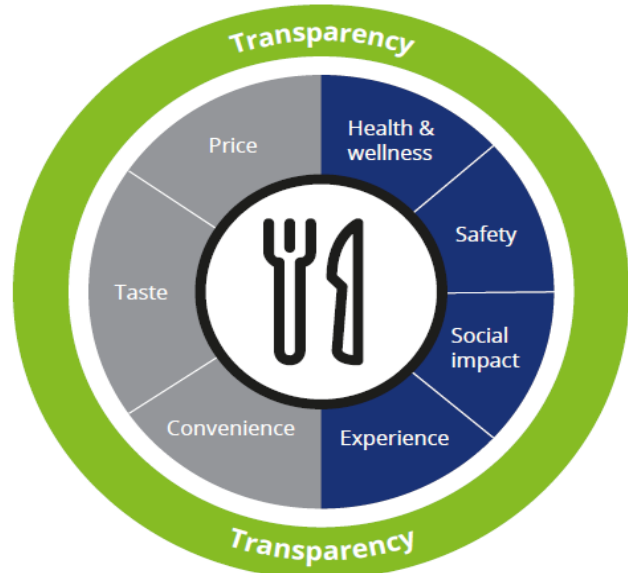


Join the Taste & Functionality Revolution

Be a part of the gold standard of healthy & innovative food and beverages



The need



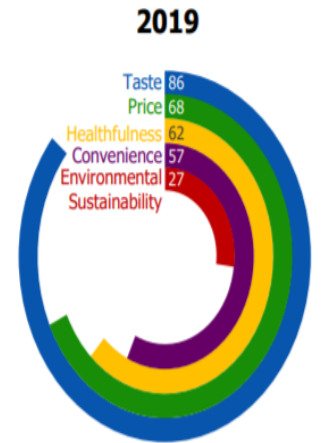
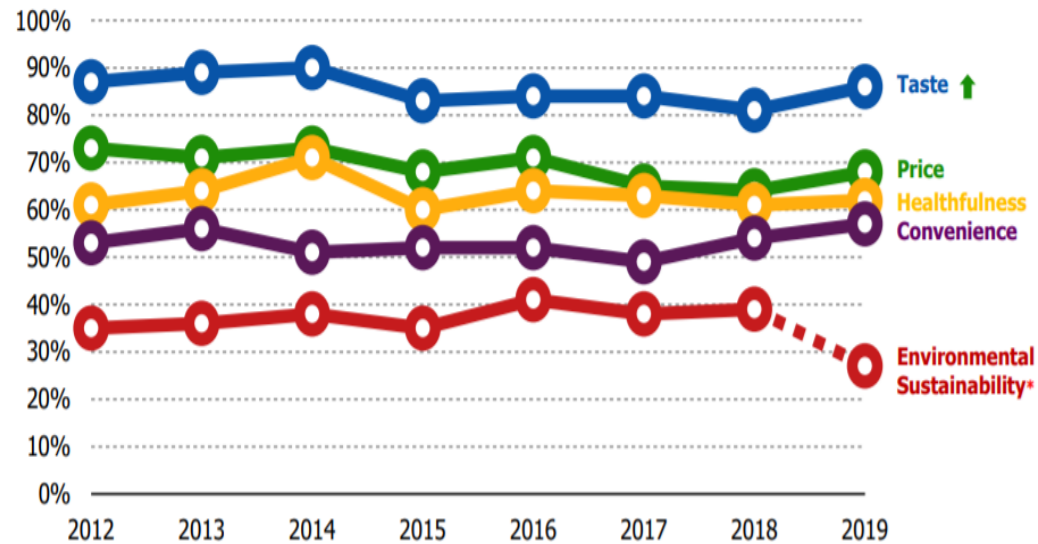
■ Traditional value drivers ■ Evolving value drivers
Source: Deloitte food value equation survey 2015, Deloitte analysis



Taste and Price Remain Top Drivers

Taste is more important to older consumers while price is more important to younger ones; the importance of taste has increased since 2018

Purchase Drivers Over Time
(% 4-5 Impact out of 5)



Q8: How much of an impact do the following have on your decision to buy foods and beverages? (n=1,012)
*Prior to 2019, Environmental Sustainability was asked simply as "Sustainability"

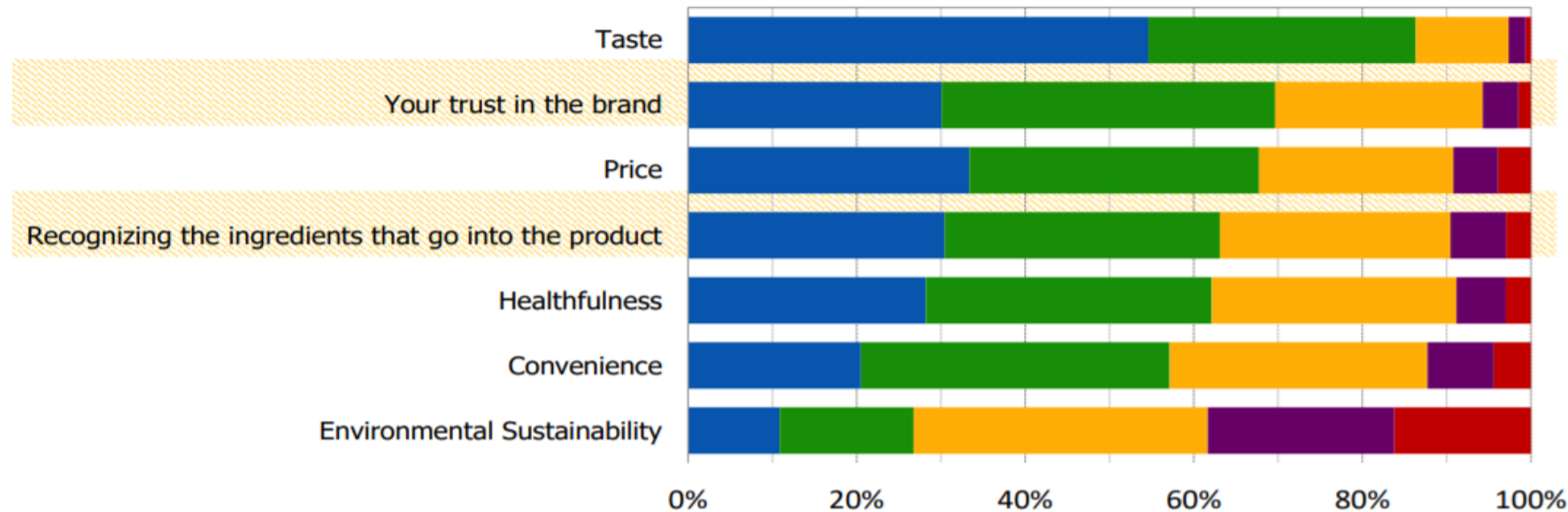
The need

Trust in Brand and Ingredient Recognition Have a Significant Impact on Purchases

3 in 10 consumers say that recognizing the ingredients and trust in the brand have a great impact, nearly as high as price

Impact of Brand Trust and Recognizable Ingredients

■ 5 - A great impact ■ 4 ■ 3 ■ 2 ■ 1 - No impact



85%

Of those 65+ say trust is a top driver vs. roughly 66% younger consumers

88%

Of consumers with no allergies in the household rate taste as most important compared to 79% of consumers with allergies in the household

Q8: How much of an impact do the following have on your decision to buy foods and beverages? (n=1,012)

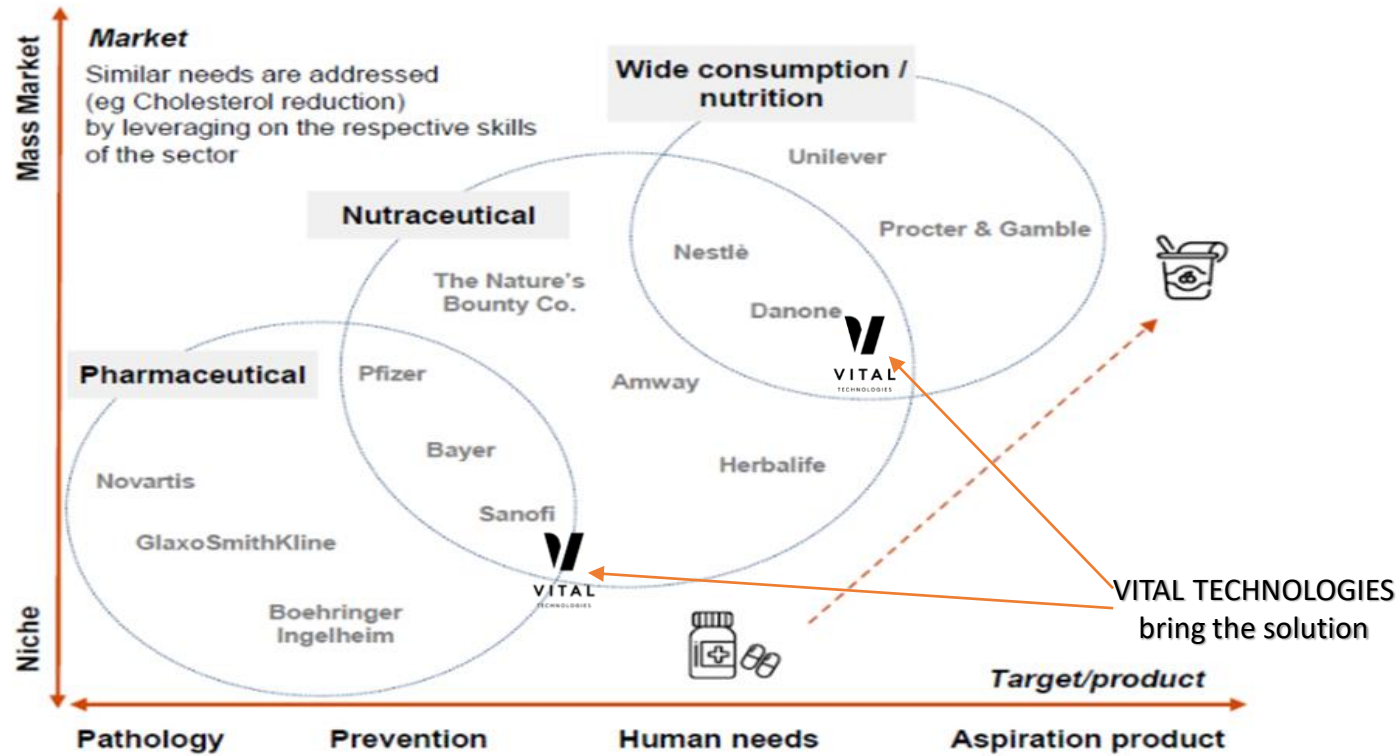
Q9: How much of an impact does the following have on your decision to buy foods and beverages? (n=1,012)



The problem

In the Nutraceutical market there are different types of players, from General Practitioners to Specialists

Nutraceuticals Market
Vitamins & Dietary Supplements Market Historical trend
Vitamins & Dietary Supplements Market Outlook trend



Key findings

The new eating habits, mostly in the Western World with (i) a **excess of sugar, salt, fats, chemical additives and tobacco** and (ii) a **shortage of fibers aminoacids, vitamins and minerals**, brought to **new emerging needs**



Emerging needs

- Attention to physical appearance and physical / mental well-being
- Slowing down of the aging process
- Need to cure metabolic disorders
- Specific health problems preventions
- Consumer habits: Health → Good Fit

Source: PwC Analysis Press



The solution- Powered by Vital

Vital's NT²TM

(Nutrient Transport Technology)

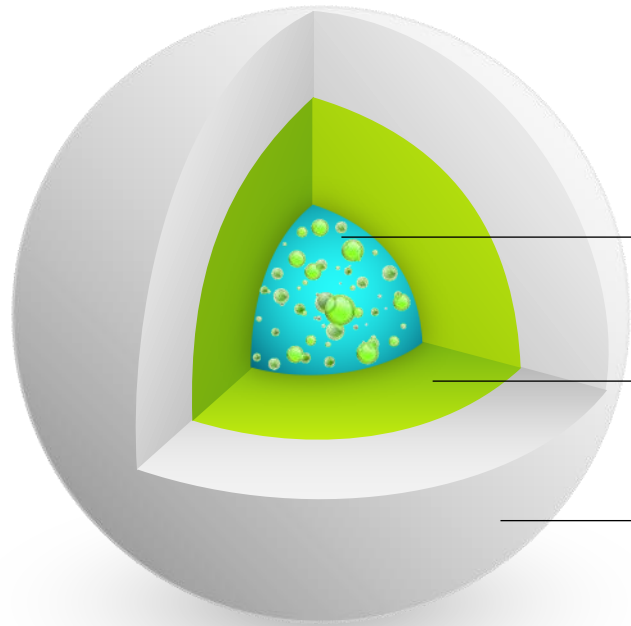
Innovative micro-encapsulation technology platform, optimized for coupling powerful, consumer-recognized cognitive, mental and physiological & superb sensory experience



INDUCING POWERFUL, CONSUMER-SENSED PERFORMANCE IN FOOD & BEVERAGE

CONFIDENTIAL

NT2™ micro-encapsulation: Miniaturizing a huge 15mm pill into microns disruptive particle.



- Bioavailability enhancing matrix
- Sustained-release control
- Water resistance & disintegration trigger control



Technological advantages

1. **Particles size**- developed for food & beverages deliveries from the sensorics and texture aspects.
2. **wet environment** -2nd generation of coatings for a wet environment -under patent submission.
3. **Foul-taste isolation**-even for large doses.
4. **Sustained release**-Ability to develop different release profiles according to product requirements.
5. **Solubility/bioavailability enhancing.**
6. **Targeting release**- Release in the organ with the best absorption in the digestive system.
7. **Science-backed Functional bio actives**- In vitro tests, human studies, sensorics tests, scientific report
8. **Dry food deliveries**: Meals, Chocolates, Bars, Protein powders, Cookies, Gummy, Melt tablets.
9. **Wet food and beverages deliveries** : Spreads, Yogurts, Soups, Chilled Juices, Smoothies, RTD.
10. **Wide portfolio** : A wide portfolio of functional encapsulated bio actives ingredients and formulations.

All the advantages together create a unique and revolutionary technology that is the next game changer in healthy & wellness trend.



The potential market



\$15 Trillion

FMCG worldwide market (2021)
Food & Beverages 53%



\$500 Billion

Functional food worldwide market (2021)

Applications



Drinks



Dairy



Sparkling water



Snacks



Bars



Naked juice



Shake



Bakery



Cookies



Tea

Ingredients Portfolio



Guarana



Natural Aspirin



Caffeine



Curcumin



Ginseng



Resveratrol



Ginger



Quercetin



NT2™ -Value Proposition:



Amateur Athletes

Extended intra-exercise duration
& power without extra training

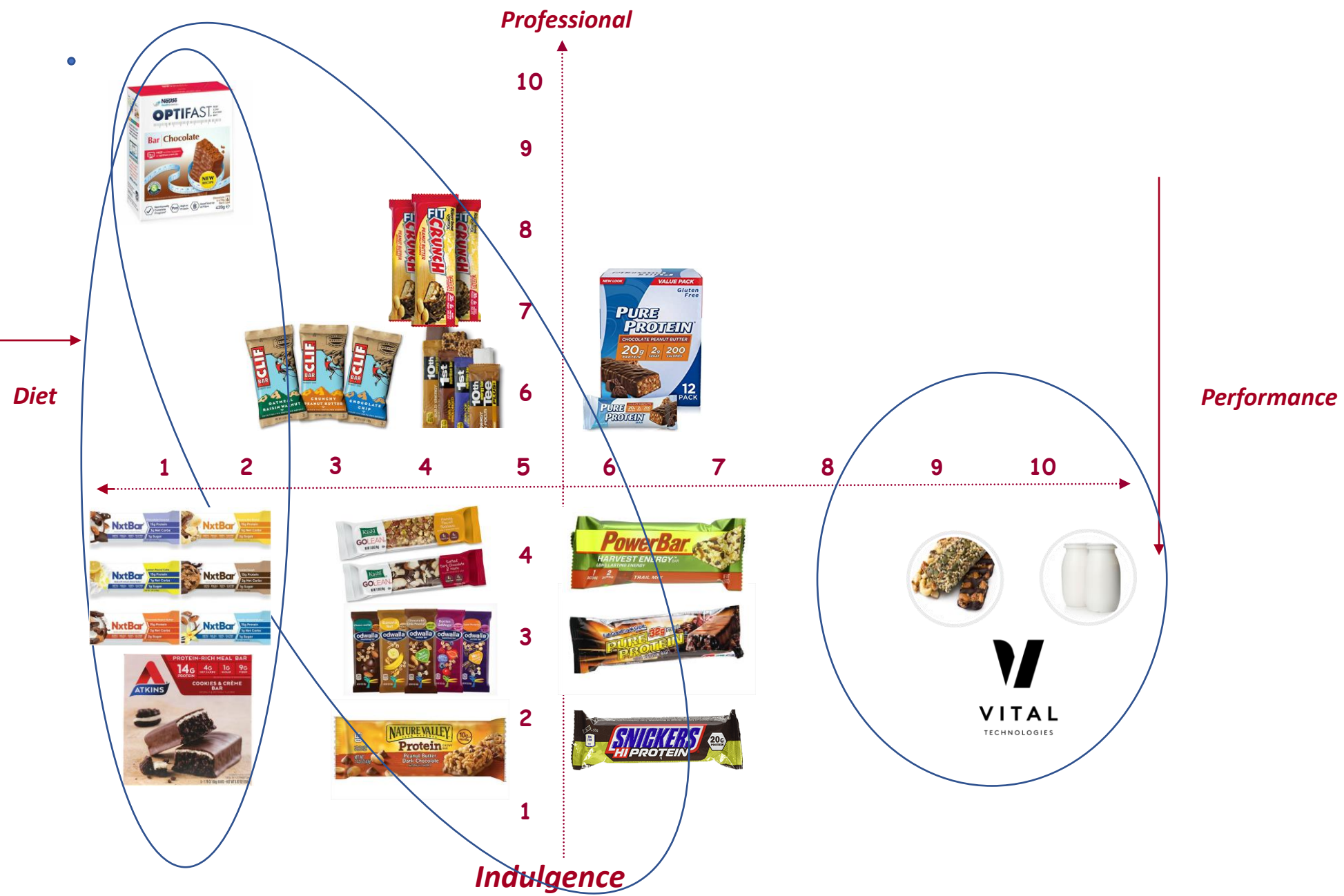
NT2™ -Value Proposition:



Elderly Wellness

Fast-acting resolution of key elderly' unmet needs: memory, energy and depression





Registered Patent-VGA – P-001-USA



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

13651 7900 09/03/2021
The Roy Cross Law Firm, LLC
50 Washington Street, Suite 737/745
Suite 737/745
Norwalk, CT 06854

EXAMINER	
SHOMER, ISAAC	
ART UNIT	PAPER NUMBER
1612	
DATE MAILED: 09/03/2021	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/513,672	03/23/2017	Amir BARZILAY	06964-P0002A	2527

TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR SELECTIVE GI TRACT DELIVERY

APPL. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$0.00	\$600	12/03/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REPLY TO THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

Page 1 of 3

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address.)

13651 7900 09/03/2021
The Roy Cross Law Firm, LLC
50 Washington Street, Suite 737/745
Suite 737/745
Norwalk, CT 06854

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/513,672	03/23/2017	Amir BARZILAY	06964-P0002A	2527

TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR SELECTIVE GI TRACT DELIVERY

APPL. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$0.00	\$600	12/03/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHOMER, ISAAC	1612	424-49000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.303).

Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47, Rev. 05-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list:
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: _____ (B) RESIDENCE: (CITY AND STATE) OR (COUNTRY): _____

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

4a. Fees submitted: Issue Fee Publication Fee (if required) Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

Electronic Payment via EFS-Web Enclosed check Non-electronic payment by credit card (Attach form PTO-2058)

The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status. NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature: _____ Date: _____

Typed or printed name: _____ Registration No.: _____

Page 2 of 3

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/513,672	03/23/2017	Amir BARZILAY	06964-P0002A	2527

13651 7900 09/03/2021
The Roy Cross Law Firm, LLC
50 Washington Street, Suite 737/745
Suite 737/745
Norwalk, CT 06854

EXAMINER	
SHOMER, ISAAC	
ART UNIT	PAPER NUMBER
1612	
DATE MAILED: 09/03/2021	

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(b)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Page 3 of 3



Registered Patent-VGA – P-002-Europe

Europäisches Patentamt
European Patent Office
Office européen des brevets

URKUNDE **CERTIFICATE** **CERTIFICAT**

Europäisches Patent **European patent** **Brevet européen**

Es wird hiermit bescheinigt, dass für die in der Patentschrift beschriebene Erfindung ein europäisches Patent für die in der Patentschrift beschriebenen Vertragsstaaten erteilt worden ist.

It is hereby certified that a European patent has been granted in respect of the invention described in the patent specification for the Contracting States designated in the specification.

Il est certifié qu'un brevet européen a été délivré pour l'invention décrite dans le fascicule de brevet, pour les Etats contractants désignés dans le fascicule de brevet.

Europäisches Patent Nr.
European patent No.
Brevet européen n°

3197436

Patentinhaber
Proprietor of the patent
Titulaire du brevet

Vital Beverages Global Inc.
Akara Building
24 De Castro Street
Waltham City 1
Tortona 1110VG

António Campinos
António Campinos
Präsident des Europäischen Patentamts
President of the European Patent Office
Président de l'Office européen des brevets

München, den 09.03.22
Munich, le

DATI IDENTIFICATIVI DEL DEPOSITO

Ruolo	Mandatario
Depositante	paolo giuseppe domenico rambelli
Data di compilazione	09/06/2022
Riferimento depositante	(0198851)-TBE-D
Titolo	COMPOSIZIONI E METODI PER EROGAZIONE SELETTIVA NEL TRATTO GI
Carattere domanda	Ordinaria

PRIVACY

Autorizzo il trattamento dei dati personali, inseriti all'interno del deposito, ai sensi del GDPR (Regolamento UE 2016/679) e del Decreto Legislativo 30 giugno 2003, n. 196 "Codice in materia di protezione dei dati personali"

RICHIEDENTEI

Natura giuridica	Persona giuridica
Denominazione	Vital Beverages Global Inc.
P.IVA/CF	
Tipo Società	soggetto estero
Nazione sede legale	Isole Vergini britanniche
Comune sede legale	
Indirizzo	
Civico	
CAP	
Telefono	
Fax	
Email	
Pec	

GOBIERNO DE ESPAÑA **MINISTERIO DE INDUSTRIA, COMERCIO Y TURISMO** **Oficina Española de Patentes y Marcas**

JUSTIFICANTE DE PRESENTACIÓN ELECTRÓNICA

Este documento es un justificante de la solicitud de protección definitiva de una patente europea concedida que designa España.

Número de envío:	300453758
Número de solicitud:	E15845037
Fecha de recepción:	24 junio 2022, 13:43 (CEST)
Oficina receptora:	OEMPI Madrid
Su referencia:	VES20220198
Solicitante:	Vital Beverages Global Inc.
Número de solicitantes:	1
País:	VG
Título:	Composiciones y métodos para el suministro selectivo en el tubo gastrointestinal
Documentos enviados:	es-ep-request.pdf (2 p.) validation-log.pdf (1 p.) SPEC.pdf (37 p.) OLF-ARCHIVE.zip
Enviados por:	CH=GARCIA GONZALEZ SERGIO -50725924E-SIN-GARCIA GONZALEZ.givenName=SERGIO.serialNumber=IDCES-50725924E.C=ES
Fecha y hora de recepción:	24 junio 2022, 13:43 (CEST)
Codificación del envío:	ED:85 DE:96:18:E7:B3:81:95:3A:17:01:DD:47:55:60:A7:FE:09:95
Validación de tasas:	-Tasa ET04 (90998210020188272631904): Validación de tasas correcta.

Novagraaf International SA
Chemins de l'Écluse 3
1213 Onex
Geneve
Suisse/Schweiz
Phone +41 22 979 0 969
Fax +41 22 979 0 960
e-mail: validation@novagraaf.com

1 מתוך 1

Novagraaf

Morningside LLC
450 7th Avenue, Suite 1001
10123 - New York
NY - USA

Geneva, June 7, 2022

ORéf: SBS191006EPPR
Y/Ref: O-197200-FLE-011

Re: In the name of Vital Beverages Global Inc.

Dear Sirs:

We confirm that according to your instructions, we have taken over the representation of the above patent in United Kingdom.

We are enclosing herewith a copy of the official form addressed to the Patent Office as well as our corresponding debit note and a summary:

EP publication #:	3 197 436 (15845037.9)
Country:	France
Validation Deadline:	June 9, 2022
Date Validation submitted to PTO:	June 6, 2022
Date Validation Complete:	June 6, 2022
Upcoming Annuity deadline and year:	September 30, (Next expiry: 2022) *
Outstanding forms and deadline to provide:	

*Novagraaf is not in charge of annuity payment

Very truly yours,
Philippe Vigand
Philippe Vigand

Encl. - Copy of the official form addressed to the Patent Office
- Debit note

Novagraaf International SA
Chemins de l'Écluse 3
1213 Onex
Geneve
Suisse/Schweiz
Phone +41 22 979 0 969
Fax +41 22 979 0 960
e-mail: validation@novagraaf.com

Novagraaf

Morningside LLC
450 7th Avenue, Suite 1001
10123 - New York
NY - USA

Geneva, June 7, 2022

ORéf: SBS191006EPPB
Y/Ref: O-197200-FLE-011

Re: In the name of Vital Beverages Global Inc.

Dear Sirs:

We confirm that according to your instructions, we have taken over the representation of the above patent in United Kingdom.

We are enclosing herewith a copy of the official form addressed to the Patent Office as well as our corresponding debit note and a summary:

EP publication #:	3 197 436 (15845037.9)
Country:	United Kingdom
Validation Deadline:	June 9, 2022
Date Validation submitted to PTO:	June 6, 2022
Date Validation Complete:	June 6, 2022
Upcoming Annuity deadline and year:	September 30, (Next expiry: 2022) *
Outstanding forms and deadline to provide:	

*Novagraaf is not in charge of annuity payment

Very truly yours,
Philippe Vigand
Philippe Vigand

Encl. - Copy of the official form addressed to the Patent Office
- Debit note

Novagraaf International SA
Chemins de l'Écluse 3
1213 Onex
Geneve
Suisse/Schweiz
Phone +41 22 979 0 969
Fax +41 22 979 0 960
e-mail: validation@novagraaf.com

Novagraaf

Morningside LLC
450 7th Avenue, Suite 1001
10123 - New York
NY - USA

Geneva, June 8, 2022

ORéf: SBS191006EPPD
Y/Ref: O-197200-FLE-002

Re: In the name of Vital Beverages Global Inc.

Dear Sirs:

We confirm that according to your instructions, we have taken over the representation of the above patent in Germany.

We are enclosing herewith a copy of the official form addressed to the Patent Office as well as our corresponding debit note and a summary:

EP publication #:	3 197 436 (15845037.9)
Country:	Germany
Validation Deadline:	June 9, 2022
Date Validation submitted to PTO:	June 7, 2022
Date Validation Complete:	June 7, 2022
Upcoming Annuity deadline and year:	September 30, (Next expiry: 2022) *
Outstanding forms and deadline to provide:	

*Novagraaf is not in charge of annuity payment

Very truly yours,
Philippe Vigand
Philippe Vigand

Encl. - Copy of the official form addressed to the Patent Office
- Debit note

Filing PCT Patent-VGA – P-004-USA



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JANUARY 11, 2022

PTAS

THE ROY GROSS LAW FIRM, LLC
50 WASHINGTON STREET, SUITE 737/745
NORWALK, CT 06854

507060595

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT RECORDATION BRANCH OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE ASSIGNMENT RECORDATION BRANCH AT 571-272-3350. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT RECORDATION BRANCH, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 01/06/2022

REEL/FRAME: 058574/0183
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

DOCKET NUMBER: 06964-P0003A

ASSIGNOR:
BLATT, YOAV

DOC DATE: 11/16/2021

ASSIGNOR:
FOX, MICHAEL

DOC DATE: 11/17/2021

ASSIGNOR:
POLITY, DORON

DOC DATE: 11/21/2021

ASSIGNOR:
SHACHAR, GILAD

DOC DATE: 11/17/2021

ASSIGNEE:
VITAL TECHNOLOGIES LTD.
1 ATIR YEDA ST., 3RD FLOOR (SIBF)
KFAR SABA, ISRAEL 4464301

APPLICATION NUMBER: 63296937

FILING DATE:

PATENT NUMBER:

ISSUE DATE:

TITLE: FORMULATIONS FOR ENCAPSULATION OF BIOACTIVE COMPOUNDS

P.O. Box 1450, Alexandria, Virginia 22313-1450 - WWW.USPTO.GOV

Filing PCT Patent-VGA-P-005-USA

MICROCAPSULES WITH ENHANCED AQUEOUS STABILITY

FIELD OF INVENTION

[01] The present invention provides microparticles encapsulating an active agent and liquid compositions comprising same.

BACKGROUND OF THE INVENTION

[02] Incorporation of high concentrations of the active compounds such as nutraceuticals and pharmaceutically active agents into liquid food products including inter alia dairy products, juices, shakes, etc., is a long-felt need. Many natural and/or synthetic active compounds are usually unstable, and are prone to oxidation/decomposition, and in addition usually are characterized by an unpleasant taste and/or odor.

[03] Taken together, the chemical lability and unfavorable organoleptic properties of the active compounds negatively affect the organoleptic properties of the food product, especially upon prolonged storage thereof.

[04] Accordingly, there is a need for compositions and methods for improving stability and for reducing or eliminating the unpleasant taste of the food supplements incorporated into a food product. Furthermore, it is highly desirable to obtain a food product comprising an effective amount of the active agent, which substantially retains the initial organoleptic properties of the pristine (non-supplemented) food product.

SUMMARY OF THE INVENTION

[05] The invention in one aspect thereof, relates to a composition comprising a plurality of particles, each of the particles (TBD)

[06] Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

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[07] Further embodiments and the full scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

DETAILED DESCRIPTION OF THE INVENTION

[08] The invention relates to a liquid composition comprising a plurality of particles, each particle comprising a hydrophobic shell encapsulating a core, wherein the core comprises an active agent.

[09] The invention further relates to methods of preparation of the particles, and methods for using the compositions of the invention, such as for supplementing a subject with a nutraceutical or a pharmaceutically active compound.

[010] The present invention is directed, in one embodiment thereof, to solid particles (e.g. a particle substantially in a solid state at a temperature below 40°C, or below 30°C) comprising a hydrophobic compound and an active ingredient selected from a food supplement and a pharmaceutically active agent, or a combination thereof, wherein the solid particles are characterized by an average particle size between 10 and 1000 µm; and wherein a weight ratio between the hydrophobic compound and the active ingredient within said particle is between 1:3 and 3:1. In another embodiment, provided herein a liquid composition or a kit comprising a plurality of particles as described herein. In one embodiment, the particles are water-dispersible particles. In one embodiment, the particle is a solid particle and consists of a shell and a core, wherein the core comprises the active ingredient and the shell comprises the hydrophobic compound.

[011] In another embodiment, there is provided herein composition in a form of a liquid or a semi-solid composition, comprising a plurality of particles of the invention, wherein an average particle size of the plurality of particles within the liquid composition is between 10 and 1000 µm, and wherein the plurality of particles stably encapsulates the active ingredient within the liquid composition for a time period of at least 90 days, at least 200 days, at least 150 days, at least 300 days, at least 1 year, including any range between. In some embodiments, the composition is a food product (e.g. in a form of a beverage, a dairy food

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CLAIMS

1. A composition comprising a plurality of particles, each particle comprising an active ingredient core encapsulated by a shell; wherein:

said plurality of particles is characterized by an average particle size between 10 and 1000 µm;

said shell comprises a hydrophobic compound comprising a fatty acid, an ester thereof, a wax, plant fat, hydrogenated plant oil, including any salt or any combination thereof;

a weight ratio between the shell and the core within said particle is between 1:3 and 3:1;

said active ingredient is selected from a food supplement and a pharmaceutically active agent, or both;

and wherein plurality of particles stably encapsulates the active ingredient in an aqueous solution for a time period of at least 90 days.

2. The composition of claim 1, wherein said hydrophobic compound is a solid at a temperature below 30°C and is characterized by a melting temperature between 40 and 100°C.

3. The composition of claim 1 or 2, wherein said plurality of particles is characterized by an average particle size between 100 and 700 µm, and wherein a weight ratio between the shell and the core within said particle is between 1:2 and 2:1.

4. The composition of any one of claims 1 to 3, wherein said shell is characterized by a pore size in a range between 10nm and 10µm.

5. The composition of any one of claims 1 to 4, wherein said core is a multi-layered core comprising a first inner layer in contact with a second layer facing the shell, wherein the second layer comprises the active ingredient.

6. The composition of claim 5, wherein a weight portion of the active

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ingredient within the particle is between 5 and 50%.

7. The composition of claim 5 or 6, wherein a w/w ratio between the first inner layer and the second layer is between 5:1 and 1:1, and wherein a weight portion of the active ingredient within the particle is between 5 and 50%.

8. The composition of any one of claims 5 to 7, wherein the first inner layer comprises a particle comprising a mono-saccharide, a di-saccharide, or a polysaccharide including any mixture, or any derivative thereof.

9. The composition of any one of claims 1 to 8, wherein said shell further comprises an additional outer layer comprising a film forming agent.

10. The composition of any one of claims 1 to 9, wherein said plurality of particles are composed essentially of food grade compounds.

11. A food product comprising the composition of any one of claims 1 to 10.

12. The food product of claim 11, wherein a w/w concentration of the composition within the liquid food product is between 0.1 and 10%.

13. The food product of claim 11 or 12, being in a form of a beverage, a dairy food product, a gel, or any combination thereof.

14. The food product of any one of claims 1 to 13, wherein the liquid food product retains at least 90% of the initial amount of the active ingredient encapsulated within the plurality of particles, for a time period of up to 200 days under appropriate storage conditions.

15. The food product of any one of claims 1 to 14, wherein said food product is substantially devoid of off-taste associated with the active ingredients.

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16. A method of supplementing a subject with an active agent, the method comprising administering to said subject the plurality of particles of any one of claims 1 to 10, or the food product of any one of claims 11 to 15.

17. The method of claim 16, wherein said method is for a targeted delivery of the active agent to the gastrointestinal tract of said subject.

18. The method of claim 16 or 17, wherein said method comprising administering to said subject a nutritionally or a therapeutically effective amount of the particles, or of the food product.

ABSTRACT

Particles comprising a polysaccharide shell and encapsulating hydrophobic compounds are provided. Further provided is a composition and a kit comprising the particle and methods of preparation thereof. Methods of use, such as for enhancing the bioavailability of the hydrophobic compound, are also provided.

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