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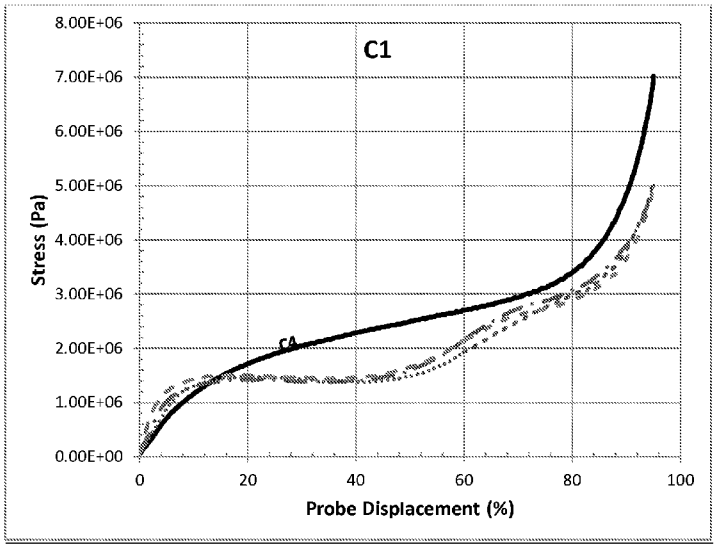
(54) Title: PARTICULATE COATED CHEWING GUM AND CONFECTIONERY; AND METHODS OF MAKING THE SAME

FIG. 2



(57) Abstract: Disclosed are chewing gum and confectionery products coated with particulates that are adhered to the product using a food grade adhesive. Also disclosed are methods of preparing the particulate coated chewing gum and confectionery products using the food grade adhesive.

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PARTICULATE COATED CHEWING GUM AND CONFECTIONERY; AND METHODS OF MAKING THE SAME

FIELD

[0001] This disclosure generally relates to chewing gum and confectionery products coated with particulates, and methods of preparing the same.

BACKGROUND

[0002] Coatings are included on confectionery and chewing gum compositions for a variety of purposes including providing a color or texture, for providing a flavor, for protection of the core, and the like.

[0003] Coatings can be prepared as smooth, uniform layers such as hard panned coatings or soft coatings. Other known coatings include particulate coatings such as the coatings on so-called "sanded" products, for example the particulate sugar coating on traditional gum drops.

[0004] There are known methods of adhering particulate ingredients to the surface of confectionery and chewing gum. Some approaches for adhering particulates to the surface of chewing gum include the use of a saccharide syrup, a sugar polyol syrup, or a gum arabic solution as a binder. An alternate approach is to heat the surface of the chewing gum to soften the surface prior to applying the particulate ingredients. A third approach is to apply the particulate ingredient to the surface of the chewing gum, followed by application of an additional solid ingredient such as a sugar polyol, heating the solid ingredient to melt it and thus adhere the particulate ingredient to the surface.

[0005] There are several drawbacks to the forgoing approaches. First, the drying time for the saccharide and sugar polyol syrups, as well as the gum arabic solution is very long. Additionally, as water is used as the solvent, it has the disadvantage of affecting water soluble and moisture sensitive particulate ingredients. The water-based binders can dissolve water soluble particulates, thereby affecting their size, shape, texture, and stability. The approaches involving heating the chewing gum substrate and melting a sugar polyol can adversely affect temperature sensitive particulate ingredients.

[0006] Additionally, some of these approaches are not amenable to all product shapes. For example, a flat format, such as chewing gum slab or stick, cannot be coated using a panning process typically employed when using the binder solutions.

[0007] There remains a need in the art for means of adhering particulate ingredients to flat surfaces of confectionery and chewing gum, which allows for subsequent processing and packaging of the coated products without loss of the particulate coating. There also remains a need in the art for the coating process to be convenient, time efficient, and suitable for use with a variety of particulate materials.

SUMMARY

[0008] In one embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; a food grade adhesive at least partially coating the surface of the chewing gum substrate and adhered to the chewing gum substrate surface; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof; and a particulate coating composition adhered to the food grade adhesive.

[0009] In one embodiment, a particulate coated confectionery product comprises a confectionery substrate comprising a surface; a food grade adhesive at least partially coating the surface of the confectionery substrate and adhered to the confectionery substrate surface; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof; and a particulate coating composition adhered to the food grade adhesive.

[0010] In one embodiment, a method of making a particulate coated confectionery or a particulate coated chewing gum product comprises applying a food grade adhesive to at least partially coat a surface of a substrate; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof, and the substrate is a confectionery or a chewing gum; and applying a particulate coating composition to form a particulate coated product.

[0011] The above described and other features are exemplified by the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings incorporated in and forming a part of the specification:

[0013] Figure 1A. Stress-strain curves for a particulate coated chewing gum product measured using a Texture Analyzer Test with a sample orientation where the particulate coating composition side is facing up so that this side was penetrated by the probe first.

[0014] Figure 1B . Stress-strain curves for a particulate coated chewing gum product and a stress-strain curve for a comparative uncoated, slab chewing gum (the curve depicted as a dashed line) measured using a Texture Analyzer Test, with a sample orientation of the particulate coated chewing gum product where the particulate coating composition side is facing down so that the side without particulate coating was penetrated by the probe first.

[0015] Figure 2. Stress-strain curves for comparative chewing gum samples C1 and C4 measured using a Texture Analyzer Test.

[0016] Figure 3. Stress-strain curves for comparative chewing gum samples C2 and C4 measured using a Texture Analyzer Test.

[0017] Figure 4. Stress-strain curves for comparative chewing gum samples C3 and C4 measured using a Texture Analyzer Test.

[0018] Figure 5. Time versus torque curve for particulate coated chewing gum product and comparative chewing gum samples measured using a Brabender Torque Test.

[0019] Figure 6. Surface parameter of interest in the surface roughness test is the distance between an upper peak (Point 1) and a lower valley (Point 2) of the surface of a sample.

[0020] Figure 7A. Schematic of the Smear Test apparatus, top view.

[0021] Figure 7B. Schematic of the Smear Test apparatus, front view.

[0022] Figure 7C. Schematic of the Smear Test apparatus, side view.

[0023] Figure 8A. Schematic of the Smear Test apparatus' slide.

[0024] Figure 8B. Schematic of the Smear Test apparatus' slide blade region.

[0025] Figure 9. Schematic of the Smear Test apparatus' side view of the left rail with groove dimensions.

DETAILED DESCRIPTION

[0026] Disclosed herein are chewing gum products and confectionery products that are at least partially coated with a particulate material, the particulate materials are adhered to the products using a food grade adhesive that is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof. It was found that this type of food grade adhesive forms a strong bond between the substrate and particulates. Additionally, these food grade adhesives are extremely quick to dry. The use of the food grade adhesive allows for larger-sized particulate material (e.g. up to 2 millimeters (mm) average diameter) to be securely adhered to the product, thereby allowing for the use of traditional packaging

equipment such as existing gum wrapping equipment without loss of the particulate material from the surface of the product during handling and packaging.

[0027] In an embodiment, a particulate coated chewing gum product, comprises a chewing gum substrate comprising a surface; a food grade adhesive at least partially coating the surface of the chewing gum substrate and adhered to the chewing gum substrate surface; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof; and a particulate coating composition adhered to the food grade adhesive. A corresponding confectionery product is contemplated.

[0028] The food grade adhesives described herein are particularly suited for use with chewing gum products since the adhesives share in common several ingredients with chewing gum base. The advantages of shared ingredients include minimizing the expense involved in product labeling changes and minimizing the risk of unforeseen or undesirable interactions between the food grade adhesive and other components of the product. Additionally, the texture of the food grade adhesive coating is similar to the chewing gum substrate, thereby allowing the consumer to notice the particulate coating composition rather than the adhesive.

[0029] The particulate coating composition comprises a plurality of particulates prepared from a variety of food products as discussed herein.

Food grade adhesive

[0030] The food grade adhesive can be a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof. Other optional ingredients may be present in the food grade adhesive, including a colorant, a flavorant, a food acid or salt thereof, a high intensity sweetener, a sensate, a solvent, or a combination thereof.

[0031] The non-toxic vinyl polymer used as the food grade adhesive can be a polyvinyl acetate, a partial hydrolysate of a polyvinyl acetate; a polyvinyl alcohol; a vinyl copolymeric elastomer such as a copolymer of vinyl acetate and vinyl laurate, a copolymer of vinyl acetate and vinyl stearate, a copolymer of ethylene and vinyl acetate; or a combination thereof. When utilized, the weight average molecular weight (Mw) of the vinyl polymer can range from about 3,000 to about 94,000, specifically 8,000 to about 65,000, and more specifically about 8,500 to about 15,000.

[0032] The gum resin or wood resin used as the food grade adhesive can be a terpene resin such as a polymer derived from alpha-pinene, beta-pinene, or d-limonene; a methyl, glycerol or pentaerythritol ester of rosins or modified rosins and gums, such as hydrogenated, dimerized or polymerized rosins, or a combination thereof; a pentaerythritol ester of partially

hydrogenated wood or gum rosin; a pentaerythritol ester of wood or gum rosin; a glycerol ester of wood rosin; a glycerol ester of partially dimerized wood or gum rosin; a glycerol ester of polymerized wood or gum rosin; a glycerol ester of tall oil rosin; a glycerol ester of wood or gum rosin; a partially hydrogenated wood or gum rosin; a partially hydrogenated methyl ester of wood or rosin; and the like; or a combination thereof.

[0033] The food grade adhesive prepared from gum base includes those gum bases described herein below in the description of the chewing gum composition ingredients. In an embodiment, the food grade adhesive comprises a gum base free of mineral adjuvant filler.

[0034] The food grade adhesive generally has a low moisture content, specifically the food grade adhesive is free of added water.

[0035] In an embodiment, the food grade adhesive is polyvinyl acetate.

[0036] In an embodiment, the food grade adhesive is wood resin.

[0037] In an embodiment, the food grade adhesive is a combination comprising polyvinyl acetate and a wood resin.

[0038] To improve the processability of the food grade adhesive for applying on the chewing gum or confectionery product, the food grade adhesive can be heated or combined with an appropriate solvent to lower the viscosity of the adhesive. Suitable solvents include a lower alkyl alcohol such as methanol, ethanol, isopropanol, and the like. In an embodiment, the solvent is ethanol. Use of these solvents allows for a convenient reduction in the viscosity of the coating for ease of processing, and as the solvents are low boiling, the adhesive dries quickly with the rapid evaporation of the solvent.

[0039] In an embodiment, the food grade adhesive does not contain a cellulose, a starch, a sweetener such as a sugar polyol, a saccharide, (e.g. maltodextrin, sucrose (sugar), dextrose, maltose, dextrin, xylose, ribose, glucose, mannose, galactose, fructose (levulose), lactose, invert sugar, fructo oligo saccharide syrups, partially hydrolyzed starch, corn syrup solids, such as high fructose corn syrup, or a combination thereof), a gum arabic, a shellac, a zein, a microbial gum, a plant-based gum, or a combination thereof. "Does not contain" used in this context means the food grade adhesive is free of the recited material.

[0040] The particulate coated confectionery composition or particulate coated chewing gum composition can comprise an amount of the food grade adhesive of about 0.1 to about 15.0 weight percent (wt%), specifically about 0.5 to about 12.0 wt%, more specifically about 1.0 to about 10.0 wt%, and yet more specifically about 1.5 to about 5.0 wt% based on the total weight of the particulate coated confectionery composition or particulate coated chewing gum composition.

Particulate Coating Composition

[0041] In general, the particulate coating composition comprises a plurality of particulates of an edible material. Exemplary components of the particulate coating composition include, amorphous saccharide particles, crystalline saccharide particles, amorphous sugar polyol particles, crystalline sugar polyol particles, baked goods particles (e.g. cake, cookies, and the like), chewing gum particles, colorant powder, colorant flakes including glitter, confectionery particles (e.g. a chewy confectionery, a crunchy confectionery, a low boiled confectionery, a hard boiled confectionery, a fondant, a caramel, a jelly, a gummy, a nougat, an edible film, a nut paste, a chocolate, fudge, a combination thereof, and the like), dried fruit particles, food acid particles, fruit granules, fruit powder, nonpareils, nut pieces, a combination thereof, and the like. The types of saccharides, sugar polyols, and colorant include those described herein below for use in the chewing gum confectionery. Exemplary types of chewing gum particulates include those chewing gum compositions described herein below.

[0042] In an embodiment, the sugar polyol particulate is chosen from those polyols having low hygroscopicity such as mannitol, maltitol, erythritol, isomalt, and the like, or combinations thereof.

[0043] The particulate coating composition or the components described in the prior paragraph may optionally further comprise a food acid or salt thereof, an additional sweetener, a sensate, a flavorant, a flavor modulator or potentiator, a colorant, a functional ingredient, or a combination thereof, as is further described herein. In some embodiments, the ingredient is encapsulated or unencapsulated (or "free"). If more than one ingredient is used, the particulate coating composition may contain any combination of encapsulated or unencapsulated ingredients.

[0044] In an embodiment, the particulate coating composition can have a water activity that is similar to the chewing gum or confectionery substrate to avoid or prevent moisture migration between the components. The particulate coating composition can have a water activity below 0.6 to avoid moisture migration from the substrate to the particulate coating composition in order for the particulate coating composition to maintain its initial texture (e.g. crunchiness) and to prevent color migration.

[0045] In an embodiment, the particulate coating composition comprises dried fruit particles. The dried fruit particles have a texture similar to the texture of chewing gum. Additionally, the dried fruit enhances the fruit flavor of a fruit-flavored chewing gum and to

give a more authentic fruit flavor. Assessment of fruit chewing gum products prepared with the food grade adhesive and dried fruit particles have an improved natural fruit taste and improved visual appearance compared to current, commercial fruit-flavored chewing gum products.

[0046] In an embodiment, the particulate coating composition can include an acid blend including two or more acids such as an acid blend of lactic acid, tartaric acid, or fumaric acid. One advantage of an acid blend is that it provides a significantly more tart or sour perception to a consumer as compared to an equivalent amount of a single acid such as citric acid used alone.

[0047] The particle size of the particulates in the particulate coating composition can be selected such that the chewing gum or confectionery product can be processed and packed on traditional gum wrapping equipment without the requirement of special equipment. For example, particulate material having an average particle size of 2 mm or less as measured by sieve analysis can be used to prepare particulate coated chewing gum or confectionery that can be processed on existing equipment, specifically an average particle size of about 10 to about 2000 micrometers, more specifically about 50 to about 1500 micrometers, and yet more specifically about 100 to about 1000 micrometers.

[0048] In an embodiment, the particulate coating composition comprises sugar polyol or saccharide particulates having an average particle size of about 300 to about 2000 micrometers, specifically about 500 to about 1700 micrometers, more specifically about 700 to about 1400 micrometers, yet more specifically about 900 to about 1100 micrometers, and still yet more specifically about 1000 micrometers. The particle size can be measured by sieve analysis.

[0049] In an embodiment, the particulate coating composition comprises sugar polyol or saccharide particulates having an average particle size of about 10 to about 300 micrometers, specifically about 25 to about 200 micrometers, more specifically about 50 to about 150 micrometers, and yet more specifically about 75 to about 100 micrometers. The particle size can be measured by sieve analysis.

[0050] In some embodiments, the particulate coating composition may include a range of particle sizes. Any particle size may be used, depending on the texture and user sensation desired.

[0051] The particulate coating on the substrate may be continuous or discontinuous. The particulate coating may completely surround, coat, cover, or enclose a substrate. Alternatively, the particulate coating can partially surround, coat, or cover the substrate. For

example, a single surface of the substrate may be coated, such as a top surface of a slab chewing gum. Still further, a surface may not be completely coated, but only partially coated.

[0052] The particulate coated confectionery composition or particulate coated chewing gum composition can comprise an amount of the particulate coating composition of about 0.1 to about 20.0 wt%, specifically about 1.0 to about 18.0 wt%, more specifically about 3.0 to about 15.0 wt%, and yet more specifically about 5.0 to about 10.0 wt% based on the total weight of the particulate coated confectionery composition or particulate coated chewing gum composition.

[0053] In an embodiment, the particulate coating composition comprises dried fruit particles, food acid particles, fruit granules, fruit powder, or a combination thereof; the particulate coating composition is present in an amount of about 0.1 to about 5.0 wt%, specifically about 0.8 to about 2.0 wt% based on the total weight of the particulate coated confectionery composition or particulate coated chewing gum composition.

[0054] In an embodiment, the particulate coating composition comprises sugar polyol particulates, saccharide particulates, or a combination thereof; the particulate coating composition is present in an amount of about 0.1 to about 10.0 wt%, specifically about 1.0 to about 5.0 wt% based on the total weight of the particulate coated confectionery composition or particulate coated chewing gum composition.

[0055] In an embodiment, the particulate coating composition comprises glitter; the particulate coating composition is present in an amount of about 0.1 to about 2.0 wt%, specifically about 0.3 to about 0.6 wt% based on the total weight of the particulate coated confectionery composition or particulate coated chewing gum composition.

[0056] In an embodiment, the coated confectionery product or coated chewing gum product comprising a particulate coating is further processed by polishing with a wax or coated with a glaze. Exemplary waxes and glazes include shellac (confectioner's glaze), mixtures of mineral oil and wax (e.g., carnauba wax, candelilla wax, etc.), and the like.

Method of Coating

[0057] The food grade adhesive can be applied to one or more surfaces of a chewing gum or confectionery product (substrate) using any suitable technique known in the art, including panning, dipping, spraying, rolling, brushing, or a combination thereof. In an embodiment, the food grade adhesive is applied by spraying technique. To aid in the

application, the food grade adhesive can be processed to reduce its viscosity, either by warming or adding a solvent as discussed above.

[0058] The food grade adhesive can be applied to a surface of the substrate to partially or fully coat the surface.

[0059] If desired, the food grade adhesive may be applied to one or more surface of the substrate in a pattern or in specific locations. Thus, the food grade adhesive may be applied to the surface to create a symbol, letter, number, design, or any desired pattern.

[0060] After application of the food grade adhesive to a surface of the substrate, the particulate coating composition is then added on top of the adhesive. In an alternative embodiment, the food grade adhesive is mixed with the particulate coating composition to form an adhesive-particulate coating composition mixture that can then be applied to the surface of a substrate. Optionally, the adhesive is then allowed to dry to result in the particulate coated confectionery or chewing gum product.

[0061] In one embodiment, a food grade adhesive is applied to a surface of a confectionery substrate or chewing gum substrate; a particulate coating composition is applied to at least a portion of the adhesive to form a coated substrate; and the coated substrate is optionally dried or conditioned to form a particulate coated confectionery product or particulate coated chewing gum product.

[0062] One or more additional applications of a food grade adhesive can be made. In an embodiment, a coating of food grade adhesive is applied over an existing coating of particulate coating composition which was adhered to a substrate using a food grade adhesive. The application of the food grade adhesive on the top of the particulate coating composition coating seals the particulates to the substrate and is excellent in preventing the particulates from falling off during handling and packaging. The additional application of the food grade adhesive on the top of the particulate coating composition is particularly suited for particulates having a size of greater than about 1 mm. The additional application of the food grade adhesive results in a glossier surface, providing a more visually attractive product for the consumer. In addition, the exterior coating of food grade adhesive functions as a barrier layer sufficient to prevent moisture migration to the ingredients of the particulate coating composition. This allows the particulate coating composition to maintain a low water activity, beneficially preserving the attributes of the particulate coating composition ingredients such as crunchiness and flavor during product shelf life.

[0063] One or more additional applications of a particulate coating composition can be made where a first and a second particulate coating composition can be the same or

different. Prior to the application of any additional particulate coating composition, an additional application of food grade adhesive can be made.

[0064] The coating processes can be conducted in batch process, a continuous process, or a combination thereof.

[0065] The particulate coated confectionery product and particulate coated chewing gum products can be further packaged using standard equipment in the confectionery and chewing gum art (e.g. gum stick packaging).

[0066] Optionally, if desired, after the step of applying the particulate coating composition has been completed, a further step of applying pressure to the particulate coated surface may be used.

Chewing gum

[0067] In an embodiment, the substrate that is coated with the food grade adhesive and particulate coating composition is a chewing gum product prepared from a chewing gum composition.

[0068] As used herein, the term "chewing gum composition" includes a composition comprising an elastomer, optionally present in a chewing gum base, and optionally further comprising water soluble chewing gum ingredients.

[0069] As used herein, the terms "bubble gum" and "chewing gum" are used interchangeably and are both meant to include any gum composition.

[0070] As used herein, the terms "elastomeric portion" and "gum base" refer to water insoluble material(s) and can include, but is not limited to, elastomers, bulking agents, waxes, elastomer solvents, emulsifiers, plasticizers, fillers, or a combination thereof.

[0071] The chewing gum composition generally contains an elastomer. The elastomer may be present in a gum base which may further include a fat, an emulsifier, and optionally an additional gum base ingredient such as a wax, a filler, an antioxidant, or a combination thereof.

[0072] The amount of gum base employed in the chewing gum composition will vary greatly depending upon various factors such as the type of base used, the consistency of the chewing gum desired, and the other components used in the composition to make the final chewing gum composition. In general, the gum base will be present in amounts of about 5 wt % to about 60 wt % based on the total weight of the chewing gum composition, specifically about 25 wt % to about 50 wt %, more specifically about 30 to about 45 wt %, and yet more

specifically about 35 to about 40 wt % based on the total weight of the chewing gum composition.

[0073] Exemplary elastomers to be used in the chewing gum composition include both natural and synthetic elastomers and rubbers, for example, substances of vegetable origin such as chicle, crown gum, nispero, rosadinha, jelutong, perillo, niger gutta, tunu, balata, gutta-percha, lechi-capsi, sorva, gutta kay, a combination thereof, and the like. Synthetic elastomers such as butadiene-styrene copolymers, polyisobutylene, isobutyleneisoprene copolymers, polyethylene, a combination thereof, and the like are also useful. The gum base can include a non-toxic vinyl polymer, such as polyvinyl acetate and its partial hydrolysate, polyvinyl alcohol, or a combination thereof. When utilized, the number average molecular weight of the vinyl polymer can range from about 3,000 to about 94,000. Additional useful polymers include crosslinked polyvinyl pyrrolidone, polymethylmethacrylate; copolymers of lactic acid, polyhydroxyalkanoates, plasticized ethylcellulose, polyvinyl acetatephthalate, or a combination thereof.

[0074] In one embodiment, the elastomer is present in an amount of about 0.2 wt% to about 15 wt% based on the total weight of the chewing gum composition, specifically about 3.0 wt% to about 8.0 wt%.

[0075] Conventional additives can be included in the gum base in effective amounts such as plasticizers or softeners to provide a variety of desirable textures and consistency properties. Because of the low molecular weight of these components, the plasticizers and softeners are able to penetrate the fundamental structure of the gum base making it plastic and less viscous. Suitable plasticizers and softeners include lanolin, palmitic acid, oleic acid, stearic acid, sodium stearate, potassium stearate, glyceryl triacetate, glyceryl lecithin, glyceryl monostearate, propylene glycol monostearate, acetylated monoglyceride, glycerine, or a combination thereof.

[0076] Waxes, for example, natural and synthetic waxes, hydrogenated vegetable oils, petroleum waxes such as polyurethane waxes, polyethylene waxes, paraffin waxes, microcrystalline waxes, fatty waxes, sorbitan monostearate, tallow, propylene glycol, and the like can also be incorporated into the gum base to obtain a variety of desirable textures and consistency properties.

[0077] When a wax is present in the gum base, it softens the polymeric elastomer mixture and improves the elasticity of the gum base. The waxes employed will have a melting point below about 60° C., and specifically about 45° C. to about 55° C. The low melting wax can be a paraffin wax. The wax can be present in the gum base in an amount

from about 1 wt% to about 10 wt%, and specifically from about 4 wt% to about 7 wt%, based on the total weight of the gum base.

[0078] In addition to the low melting point waxes, waxes having a higher melting point can be used in the gum base in amounts up to about 5 wt%, based on the total weight of the gum base. Such high melting waxes include beeswax, vegetable wax, candelilla wax, carnauba wax, most petroleum waxes, and the like, or a combination thereof.

[0079] The chewing gum composition or gum base can optionally contain conventional elastomer solvents to aid in softening the elastomer base component, for example terpene resins such as polymers of alpha-pinene, beta-pinene, or d-limonene; methyl, glycerol or pentaerythritol esters of rosins or modified rosins and gums, such as hydrogenated, dimerized or polymerized rosins, or a combination thereof, the pentaerythritol ester of partially hydrogenated wood or gum rosin, the pentaerythritol ester of wood or gum rosin, the glycerol ester of wood rosin, the glycerol ester of partially dimerized wood or gum rosin, the glycerol ester of polymerized wood or gum rosin, the glycerol ester of tall oil rosin, the glycerol ester of wood or gum rosin, the partially hydrogenated wood or gum rosin, the partially hydrogenated methyl ester of wood or rosin, and the like, or a combination thereof. The elastomer solvent can be used in amounts of about 5 wt % to about 75 wt % based on the total weight of the gum base, and specifically about 45 wt % to about 70 wt %.

[0080] The gum base can include an effective amount of a bulking agent such as a mineral adjuvant, which can serve as fillers and textural agents. Suitable mineral adjuvants include calcium carbonate, magnesium carbonate, alumina, aluminum hydroxide, aluminum silicate, talc, tricalcium phosphate, tricalcium phosphate and the like, or a combination thereof. These fillers or adjuvants can be used in the gum base in various amounts. Specifically the amount of filler, when used, can be present in an amount of greater than about 0 wt % to about 60 wt % based on the total weight of the gum base, and more specifically about 20 wt % to about 30 wt %.

[0081] Suitable emulsifiers include distilled monoglycerides, acetic acid esters of mono and diglycerides, citric acid esters of mono and diglycerides, lactic acid esters of mono and diglycerides, mono and diglycerides, polyglycerol esters of fatty acids, ceteareth-20, polyglycerol polyricinoleate, propylene glycol esters of fatty acids, polyglyceryl laurate, glyceryl cocoate, gum arabic, acacia gum, sorbitan monostearates, sorbitan tristearates, sorbitan monolaurate, sorbitan monooleate, sodium stearoyl lactylates, calcium stearoyl lactylates, diacetyl tartaric acid esters of mono- and diglycerides, glyceryl tricaprylate-caprate / medium chain triglycerides, glyceryl dioleate, glyceryl oleate, glyceryl lacto esters of fatty

acids, glyceryl lacto palmitate, glyceryl stearate, glyceryl laurate, glycerly dilaurate, glyceryl monoricinoleate, triglyceryl monostearate, hexaglyceryl distearate, decaglyceryl monostearate, decaglyceryl dipalmitate, decaglyceryl monooleate, polyglyceryl 10 hexaoleate, medium chain triglycerides, caprylic/capric triglyceride, propylene glycol monostearate, polysorbate 20, polysorbate 40, polysorbate 60, polysorbate 80, polysorbate 65, hexylglyceryl distearate, triglyceryl monostearate, tweens, spans, stearoyl lactylates, calcium stearoyl-2-lactylate, sodium stearoyl-2-lactylate lecithin, ammonium phosphatide, sucrose esters of fatty acids, sucroglycerides, propane-1,2-diol esters of fatty acids, or a combination thereof.

[0082] Additional components of the chewing gum composition can include an antioxidant, a bulk sweetener, a colorant, a flavorant, a flavor modulator or flavor potentiator, a functional ingredient, high intensity sweetener, a food acid or salt thereof, a sensate, a softener, a medicament, an oral care agent, a throat care agent, a breath freshener, or a combination thereof.

[0083] The bulk sweetener for use in the chewing gum composition can include sugar sweeteners, sugarless sweeteners, or a combination thereof. Bulk sugar sweeteners generally include saccharides. Suitable sugar sweeteners include mono-saccharides, di-saccharides and poly-saccharides such as but not limited to, sucrose (sugar), dextrose, maltose, dextrin, xylose, ribose, glucose, mannose, galactose, fructose (levulose), lactose, invert sugar, fructo oligo saccharide syrups, partially hydrolyzed starch, corn syrup solids, such as high fructose corn syrup, glucose syrup, or a combination thereof.

[0084] The bulk sugarless sweetener can be a sugar polyol such as erythritol, galactitol, hydrogenated isomaltulose (isomalt), a hydrogenated starch hydrolysate, lactitol, maltitol, mannitol, polyglycitol, sorbitol, xylitol, or a combination thereof.

[0085] The bulk sweetener can be present in the chewing gum composition in an amount of about 40 to about 60 wt% based on the total weight of the chewing gum composition, specifically about 45 to about 55 wt%, and yet more specifically about 48 to about 53 wt%.

[0086] A sweet taste in the chewing gum composition can come from flavor modulators or potentiators and/or from flavorants as well as from sweeteners. Flavor potentiators can consist of materials that intensify, supplement, modify or enhance the taste or aroma perception of an original material without introducing a characteristic taste or aroma perception of their own. Flavor modulators can impart a characteristic of their own that complements or negates a characteristic of another component. In some embodiments, flavor

modulators or potentiators are designed to intensify, supplement, modify, or enhance the perception of flavor, sweetness, tartness, umami, kokumi, saltiness or a combination thereof can be included. Thus, the addition of flavor modulators or potentiators can impact the overall taste of the comestible. For example, flavors can be compounded to have additional sweet notes by the inclusion of flavor modulators or potentiators, such as vanilla, vanillin, ethyl maltol, furfual, ethyl propionate, lactones, or a combination thereof.

[0087] Exemplary flavor modulators or potentiators include monoammonium glycyrrhizinate, licorice glycyrrhizinates, citrus aurantium, alapyridaine, alapyridaine (N-(1-carboxyethyl)-6-(hydroxymethyl)pyridinium-3-ol) inner salt, miraculin, curculin, strogin, mabinlin, gymnemic acid, cynarin, glupyridaine, pyridinium-betain compounds, neotame, thaumatin, neohesperidin dihydrochalcone, tagatose, trehalose, maltol, ethyl maltol, vanilla extract, vanilla oleoresin, vanillin, sugar beet extract (alcoholic extract), sugarcane leaf essence (alcoholic extract), compounds that respond to G-protein coupled receptors (T2Rs and T1Rs), or a combination thereof. In some embodiments, sugar acids, sodium chloride, potassium chloride, sodium acid sulfate, or a combination thereof are used. In other embodiments, glutamates such as monosodium glutamate, monopotassium glutamate, hydrolyzed vegetable protein, hydrolyzed animal protein, yeast extract, or a combination thereof are included. Further examples include adenosine monophosphate (AMP), glutathione, and nucleotides such as inosine monophosphate, disodium inosinate, xanthosine monophosphate, guanylate monophosphate, or a combination thereof. Further examples of flavor potentiator compositions that impart kokumi are also included in U.S. Patent No. 5,679,397 to Kuroda et al.

[0088] The amount of flavor modulators, flavor potentiators, and flavorants used herein can be a matter of preference subject to such factors as the type of final product composition, the individual flavor, the chewing gum composition employed, and the strength of flavor desired. Thus, the amount of flavoring can be varied in order to obtain the result desired in the final product and such variations are within the capabilities of those skilled in the art without the need for undue experimentation.

[0089] Flavorants (flavor, flavoring agent) that can be used include those artificial or natural flavors known in the art, for example synthetic flavor oils, natural flavoring aromatics and/or oils, oleoresins, extracts derived from plants, leaves, flowers, fruits, and the like, or a combination thereof. Nonlimiting representative flavors include oils such as spearmint oil, cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, allspice, oil of sage, mace, oil of

bitter almonds, cassia oil, and citrus oils including lemon, orange, lime, grapefruit, vanilla, fruit essences, including apple, pear, peach, grape, strawberry, raspberry, blackberry, cherry, plum, pineapple, apricot, banana, melon, tropical fruit, mango, mangosteen, pomegranate, papaya, honey lemon, and the like, or a combination thereof. Specific flavorants are mints such as peppermint, spearmint, artificial vanilla, cinnamon derivatives, and various fruit flavors.

[0090] Other types of flavorants include various aldehydes and esters such as cinnamyl acetate, cinnamaldehyde, citral diethylacetal, dihydrocarvyl acetate, eugenyl formate, p-methylamisol, acetaldehyde (apple), benzaldehyde (cherry, almond), anisic aldehyde (licorice, anise), cinnamic aldehyde (cinnamon), citral, i.e., alpha-citral (lemon, lime), neral, i.e., beta-citral (lemon, lime), decanal (orange, lemon), ethyl vanillin (vanilla, cream), heliotrope, i.e., piperonal (vanilla, cream), vanillin (vanilla, cream), alpha-amyl cinnamaldehyde (spicy fruity flavors), butyraldehyde (butter, cheese), valeraldehyde (butter, cheese), citronellal (modifies, many types), decanal (citrus fruits), aldehyde C-8 (citrus fruits), aldehyde C-9 (citrus fruits), aldehyde C-12 (citrus fruits), 2-ethyl butyraldehyde (berry fruits), hexenal, i.e., trans-2 (berry fruits), tolyl aldehyde (cherry, almond), veratraldehyde (vanilla), 2,6-dimethyl-5-heptenal, i.e., melonal (melon), 2,6-dimethyloctanal (green fruit), and 2-dodecenal (citrus, mandarin).

[0091] The flavorant can be used in liquid or solid form. When used in solid (dry) form, suitable drying means such as spray drying the oil can be used. Alternatively, the flavorant can be encapsulated, absorbed onto water soluble materials by means known in the art, for example onto cellulose, starch, sugar, maltodextrin, gum arabic, and the like.

[0092] The chewing gum composition can further comprise a softener. Exemplary softeners include lanolin, palmitic acid, oleic acid, stearic acid, sodium stearate, potassium stearate, glyceryl triacetate, lecithin, glyceryl lecithin, glyceryl monostearate, propylene glycol monostearate, an acetylated monoglyceride, glycerine, a natural or synthetic wax, a hydrogenated vegetable oil, sorbitan monostearate, tallow, propylene glycol, or a combination thereof, specifically an acetylated monoglyceride, lecithin, glycerine, a hydrogenated starch hydrolysate (e.g., Lycasin 80/55), or a combination thereof.

[0093] The softener can be present in the chewing gum composition in an amount of about 1 to about 5 wt% based on the total weight of the chewing gum composition, specifically about 1.5 to about 4 wt%, and more specifically about 2 to about 3 wt%.

[0094] The food acid suitable for use in the chewing gum composition include acetic acid, adipic acid, ascorbic acid, butyric acid, citric acid, formic acid, fumaric acid, glyconic

acid, lactic acid, phosphoric acid, malic acid, oxalic acid, succinic acid, tartaric acid, or a combination thereof, and alkali metal salts thereof (e.g., sodium citrate dihydrate).

[0095] The food acid can be present in the chewing gum composition in an amount of about 0.01 to about 2.0 wt% based on the total weight of the chewing gum composition, specifically about 0.1 to about 1.5 wt%, and more specifically about 0.3 to about 1.0 wt%.

[0096] The chewing gum composition may further include a high intensity sweetener. A "high intensity sweetener" as used herein means agents having a sweetness greater than the sweetness of sucrose. In some embodiments, a high intensity sweetener has a sweetness that is at least 100 times that of sugar (sucrose) on a per weight basis, specifically at least 500 times that of sugar on a per weight basis. In one embodiment the high intensity sweetener is at least 1,000 times that of sugar on a per weight basis, more specifically at least 5,000 times that of sugar on a per weight basis. The high intensity sweetener can be selected from a wide range of materials, including water-soluble sweeteners, water-soluble artificial sweeteners, water-soluble sweeteners derived from naturally occurring water-soluble sweeteners, dipeptide based sweeteners, protein based sweeteners, or a combination thereof. Without being limited to particular sweeteners, representative categories and examples include:

water-soluble sweetening agents such as dihydrochalcones, monellin, steviosides, rebaudiosides, glycyrrhizin, dihydroflavenol, monatin, and L-aminodicarboxylic acid aminoalkenoic acid ester amides, such as those disclosed in U.S. Pat. No. 4,619,834, or a combination thereof;

water-soluble artificial sweeteners such as soluble saccharin salts, i.e., sodium or calcium saccharin salts, cyclamate salts, acesulfame salts, such as the sodium, ammonium or calcium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide, the potassium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide (Acesulfame-K), the free acid form of saccharin, or a combination thereof; dipeptide based sweeteners, for example the L-aspartic acid derived sweeteners such as L-aspartyl-L-phenylalanine methyl ester (Aspartame) and materials described in U.S. Pat. No. 3,492,131, L-alpha-aspartyl-N-(2,2,4,4-tetramethyl-3-thietanyl)-D-alaninamide hydrate (Alitame), methyl esters of L-aspartyl-L-phenylglycerine and L-aspartyl-L-2,5-dihydrophenyl-glycine, L-aspartyl-2,5-dihydro-L-phenylalanine; L-aspartyl-L-(l-cyclohexen)-alanine, neotame, or a combination thereof;

water-soluble sweeteners derived from naturally occurring water-soluble sweeteners, such as steviosides and stevia derived compounds such as but not limited to steviol glycosides such as rebaudiocides including rebaudiocide A, and the like, lo han quo and lo han quo derived compounds such as iso-mogroside V and the like, chlorinated

derivatives of ordinary sugar (sucrose), e.g., chlorodeoxysugar derivatives such as derivatives of chlorodeoxysucrose or chlorodeoxygalactosucrose, known, for example, under the product designation of Sucralose; examples of chlorodeoxysucrose and chlorodeoxygalactosucrose derivatives include but are not limited to: 1-chloro-1'-deoxysucrose; 4-chloro-4-deoxy-alpha-D-galactopyranosyl-alpha-D-fructofuranoside, or 4-chloro-4-deoxygalactosucrose; 4-chloro-4-deoxy-alpha-D-galactopyranosyl-1-chloro-l-deoxy-beta-D-fructo-furanoside, or 4,1'-dichloro-4,1'-dideoxygalactosucrose; 1',6'-dichloro1',6'-dideoxysucrose; 4-chloro-4-deoxy-alpha-D-galactopyranosyl-1,6-dichloro-l,6-dideoxy-beta-D- fructofuranoside, or 4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose; 4,6-dichloro-4,6-dideoxy-alpha-D-galactopyranosyl-6-chloro-6-deoxy-beta-D- fructofuranoside, or 4,6,6'-trichloro-4,6,6'-trideoxygalactosucrose; 6,1',6'-trichloro-6,1',6'-trideoxysucrose; 4,6-dichloro-4,6-dideoxy-alpha-D-galacto-pyranosyl-1,6-dichloro-l,6-dideox y-beta-D-fructofuranoside, or 4,6,1',6'-tetrachloro4,6,1',6'-tetradeoxygalacto-sucrose; 4,6,1',6'-tetradeoxy-sucrose, or a combination thereof;

protein based sweeteners such as thaumaoccous danielli, talin, or a combination thereof; and

amino acid based sweeteners.

[0097] The high intensity sweetener can be used in a variety of distinct physical forms, for example those known in the art to provide an initial burst of sweetness and/or a prolonged sensation of sweetness. Without being limited thereto, such physical forms include free forms (e.g., spray dried or powdered), beaded forms, encapsulated forms, or a combination thereof.

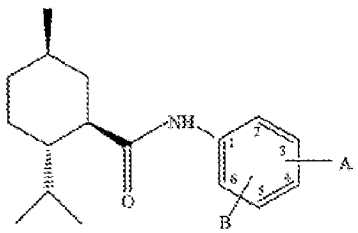
[0098] Specific high intensity sweeteners for use in the chewing gum composition include aspartame, neotame, sucralose, monatin, acesulfame potassium, an encapsulated form of the foregoing high intensity sweetener, or a combination thereof.

[0099] The amount of high intensity sweetener present in the chewing gum composition can be about 1 to about 6 wt% based on the total weight of the chewing gum composition, specifically about 3 to about 5 wt%.

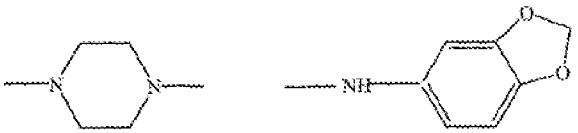
[0100] The chewing gum composition can further include a sensate. Sensates can include cooling agents, warming agents, tingling agents, effervescent agents, or a combination thereof.

[0101] Cooling agents are additives that provide a cooling or refreshing effect in the mouth, in the nasal cavity, or on skin. For example, among the useful cooling agents are included menthane, menthone, ketals, menthone ketals, menthone glycerol ketals, substituted p-menthanes, acyclic carboxamides, mono menthyl glutarate, substituted cyclohexanamides,

substituted cyclohexane carboxamides, substituted ureas and sulfonamides, substituted menthanols, hydroxymethyl and hydroxymethyl derivatives of p-menthane, 2-mercapto-cyclo-decanone, hydroxycarboxylic acids with 2-6 carbon atoms, cyclohexanamides, menthyl acetate, menthyl salicylate, N,2,3-trimethyl-2-isopropyl butanamide (WS-23), N-ethyl-2,2-diisopropylbutanamide, N-ethyl-p-menthane-3-carboxamide (WS-3), ethyl ester of N-[[5-methyl-2-(1-methylethyl)cyclohexyl]carbonyl]glycine (WS5), as well as the substantially pure ethyl ester of N-[[5-methyl-2-(1-methylethyl)cyclohexyl]carbonyl]glycine as disclosed in U.S. Patent No. 7,189760 to Erman, et al which is incorporated in its entirety herein by reference, isopulegol, menthyloxy propane diol, 3-(l-menthoxy)propane-1,2-diol, 3-(l-menthoxy)-2-methylpropane-1,2-diol, p-menthane-2,3-diol, p-menthane-3,8-diol, 6-isopropyl-9-methyl-1,4-dioxaspiro[4,5]decane-2-methanol, menthyl succinate and its alkaline earth metal salts, trimethylcyclohexanol, N-ethyl-2-isopropyl-5-methylcyclohexanecarboxamide, Japanese mint oil, peppermint oil, 3-(l-menthoxy)ethan-1-ol, 3-(l-menthoxy)propan-1-ol, 3-(l-menthoxy)butan-1-ol, l-menthylacetic acid N-ethylamide, l-menthyl-4-hydroxypentanoate, l-menthyl-3-hydroxybutyrate, N,2,3-trimethyl-2-(1-methylethyl)-butanamide, n-ethyl-t-2-c-6 nonadienamide, N,N-dimethyl menthyl succinamide, substituted p-menthanes, substituted p-menthane-carboxamides, 2-isopropanyl-5-methylcyclohexanol (from Hisamitsu Pharmaceuticals, hereinafter "isopregol"); menthone glycerol ketals (FEMA 3807, tradename FRESCOLAT® type MGA); 3-l-menthoxypropane-1,2-diol (from Takasago, FEMA 3784); and menthyl lactate; (from Haarman & Reimer, FEMA 3748, tradename FRESCOLAT® type ML), WS-30, WS-14, Eucalyptus extract (p-Mehtha-3,8-Diol), Menthol (its natural or synthetic derivatives), Menthol PG carbonate, Menthol EG carbonate, Menthol glyceryl ether, N-tertbutyl-p-menthane-3-carboxamide, P-menthane-3-carboxylic acid glycerol ester, Methyl-2-isopryl-bicyclo (2.2.1), Heptane-2-carboxamide; Menthol methyl ether, menthyl pyrrolidone carboxylate; 2,5-dimethyl-4-(1-pyrrolidinyl)-3(2H)-furanone; cyclic α-keto enamines, cyclotene derivatives such as cyclopentenes including 3-methyl-2-(1-pyrrolidinyl)-2-cyclopenten-1-one and 5-methyl-2-(1-pyrrolidinyl)-2-cyclopenten-1-one, compounds of the formula:



wherein B is selected from H, CH_3, C_2H_5, OCH_3, OC_2H_5; and OH; and wherein A is a moiety of the formula-CO-D, wherein D is selected from the following moieties: (i)-NR^1R^2, wherein R^1 and R^2 are independently selected from H and C_1-C_8 straight or branched-chain aliphatic, alkoxyalkyl, hydroxyalkyl, araliphatic and cycloalkyl groups, or R^1 and R^2 together with the nitrogen atom to which they are attached form part of an optionally-substituted, five-or six-membered heterocyclic ring; (ii)-$NHCH_2COOCH_2CH_3$,-$NHCH_2CONH_2$,-$NHCH_2CH_2OCH_3$,-$NHCH_2CH_2OH$,-$NHCH_2CH(OH)CH_2OH$ and (iii) a moiety selected from the group consisting of:



as disclosed in PCT Patent Application WO2006/125334 to Bell et al. which is incorporated in its entirety herein by reference, among others. Other compounds include the alpha-keto enamines disclosed in U.S. Patent Number 6,592,884 to Hofmann et al. which is incorporated in its entirety herein by reference. These and other suitable cooling agents are further described in the following U.S. patents, all of which are incorporated in their entirety by reference hereto: U.S. 4,230,688; 4,032,661; 4,459,425; 4,178,459; 4,296,255; 4,136,163; 5,009,893; 5,266,592; 5,698,181; 6,277,385; 6,627,233; 7,030,273. Still other suitable cooling agents are further described in the following U.S. Published Patent Applications, all of which are incorporated in their entirety by reference hereto: U.S. 2005/0222256; 2005/0265930.

[0102] Warming agents can be selected from a wide variety of compounds known to provide the sensory signal of warming to the user. These compounds offer the perceived sensation of warmth, particularly in the oral cavity, and often enhance the perception of flavors, sweeteners and other organoleptic components. Among the useful warming compounds included are vanillyl alcohol n-butylether (TK-1000) supplied by Takasago Perfumary Company Limited, Tokyo, Japan, vanillyl alcohol n-propylether, vanillyl alcohol isopropylether, vanillyl alcohol isobutylether, vanillyl alcohol n-aminoether, vanillyl alcohol isoamylether, vanillyl alcohol n-hexylether, vanillyl alcohol methylether, vanillyl alcohol ethylether, gingerol, shogaol, paradol, zingerone, capsaicin, dihydrocapsaicin, nordihydrocapsaicin, homocapsaicin, homodihydrocapsaicin, ethanol, isopropol alcohol, iso-amylalcohol, benzyl alcohol, glycerine, or a combination thereof.

[0103] Tingling agents may be employed to provide a tingling, stinging or numbing sensation to the user. Tingling agents include, but are not limited to: Jambu Oleoresin or para cress (Spilanthes sp.), in which the active ingredient is Spilanthol; Japanese pepper extract (Zanthoxylum peperitum), including the ingredients known as Saanshool-I, Saanshool-II and Sanshoamide; perillartine; 4-(1-menthoxymethyl)-2-phenyl-1,3-dioxolane; black pepper extract (piper nigrum), including the active ingredients chavicine and piperine; Echinacea extract; Northern Prickly Ash extract; trans-pellitorin, and red pepper oleoresin. In some embodiments, alkylamides extracted from materials such as jambu or sanshool may be included. Additionally, in some embodiments, a sensation is created due to effervescence. Such effervescence is created by combining an alkaline material with an acidic material, either or both of which may be encapsulated. In some embodiments, an alkaline material may include alkali metal carbonates, alkali metal bicarbonates, alkaline earth metal carbonates, alkaline earth metal bicarbonates or a combination thereof. In some embodiments, an acidic material may include acetic acid, adipic acid, ascorbic acid, butyric acid, citric acid, formic acid, fumaric acid, glyconic acid, lactic acid, phosphoric acid, malic acid, oxalic acid, succinic acid, tartaric acid or a combination thereof. Examples of "tingling" type sensates include those disclosed in U.S. Patent Nos. 6,780,443, 6,159,509, 5,545,424, and 5,407,665, each of which is incorporated by reference herein in its entirety.

[0104] The amount of sensate present in the chewing gum composition can be up to about 5.0 wt% based on the total weight of the chewing gum composition, specifically about 1.0 to about 4.0 wt%, and more specifically about 2.0 to about 3.0 wt%.

[0105] The chewing gum composition can optionally further include a functional ingredient such as a breath freshener, a dental care component, a pharmaceutically active agent, an herbal, an effervescing system, an appetite suppressor, a vitamin, a micronutrient, a mouth moistening component, a throat care component, an energy boosting agent, a concentration boosting agent, or a combination thereof.

[0106] Coloring agents (colors, colorants, colorings) can be used in amounts effective to produce a desired color for the composition. Suitable coloring agents include pigments, which can be incorporated in amounts up to about 6 wt% based on the total weight of the composition. For example, titanium dioxide can be incorporated in amounts up to about 2 wt%, and specifically less than about 1 wt%. Suitable coloring agents also include natural food colors and dyes suitable for food, drug, and cosmetic applications. Suitable colors include annatto extract (E160b), bixin, norbixin, astaxanthin, dehydrated beets (beet powder), beetroot red/betanin (E162), ultramarine blue, canthaxanthin (E161g), cryptoxanthin (E161c),

rubixanthin (E161d), violanxanthin (E161e), rhodoxanthin (E161f), caramel (E150(a-d)), β-apo-8′-carotenal (E160e), β-carotene (E160a), alpha carotene, gamma carotene, ethyl ester of beta-apo-8 carotenal (E160f), flavoxanthin (E161a), lutein (E161b), cochineal extract (E120), carmine (E132), carmoisine/azorubine (E122), sodium copper chlorophyllin (E141), chlorophyll (E140), toasted partially defatted cooked cottonseed flour, ferrous gluconate, ferrous lactate, grape color extract, grape skin extract (enocianina), anthocyanins (E163), haematococcus algae meal, synthetic iron oxide, iron oxides and hydroxides (E172), fruit juice, vegetable juice, dried algae meal, tagetes (Aztec marigold) meal and extract, carrot oil, corn endosperm oil, paprika, paprika oleoresin, phaffia yeast, riboflavin (E101), saffron, titanium dioxide, turmeric (E100), turmeric oleoresin, amaranth (E123), capsanthin/capsorbin (E160c), lycopene (E160d), FD&C blue #1, FD&C blue #2, FD&C green #3, FD&C red #3, FD&C red #40, FD&C yellow #5 and FD&C yellow #6, tartrazine (E102), quinoline yellow (E104), sunset yellow (E110), ponceau (E124), erythrosine (E127), patent blue V (E131), titanium dioxide (E171), aluminium (E173), silver (E174), gold (E175), pigment rubine/lithol rubine BK (E180), calcium carbonate (E170), carbon black (E153), black PN/brilliant black BN (E151), green S/acid brilliant green BS (E142), or a combination thereof. In some embodiments, certified colors can include FD&C aluminum lakes, or a combination thereof. A full recitation of all FD& C colorants and their corresponding chemical structures may be found in the Kirk-Othmer Encyclopedia of Chemical Technology, 4th Edition, in volume 1 at pages 492-494, which text is incorporated herein by reference.

[0107] Coloring agents can also include food grade glitter which can be incorporated into the chewing gum. The edible glitter can include a food grade colorant and a carrier such as a sugar, a sugar polyol, a disaccharide, a polysaccharide, a hydrocolloid material, or a combination thereof.

[0108] The coloring agent can include food grade pearlescent pigments prepared from mica optionally coated with titanium dioxide, iron oxide, and the like.

[0109] The chewing gum compositions can be prepared using standard techniques and equipment. In one exemplary process, a gum base is heated to a temperature sufficiently high to soften the base without adversely affecting the physical and chemical make up of the base, which will vary depending upon the composition of the gum base used, and is readily determined by those skilled in the art without undue experimentation. For example, the gum base can be conventionally melted to about 60°C to about 160°C, or melted to about 150°C to about 175°C, for a period of time sufficient to render the base molten, e.g., about thirty minutes, just prior to being admixed incrementally with the remaining ingredients of the base

such as the plasticizer, fillers, the bulking agent or sweeteners, the softener and coloring agents to plasticize the blend as well as to modulate the hardness, viscoelasticity and formability of the base, and the flavor enhancing composition (as a concentrate with other additives or separately). Mixing is continued until a uniform mixture of the gum composition is obtained. Thereafter the gum composition mixture can be formed into a desired shape.

[0110] In another exemplary process, chewing gum ingredients are mixed with gum base; mixing is continued until a uniform or homogeneous mixture of the chewing gum composition is obtained. Thereafter the chewing gum composition can be formed into a desired shape. Within this embodiment, the starting gum base can be in an unmolten form, such as in the form of a pelletized gum base, that can be softened at 40 to 50°C rather than melting at higher temperatures as in the prior embodiment.

[0111] The chewing gum composition can be formed using a variety of processes including an extrusion process, a coextrusion process, a triple extrusion process, a laminate process, a molding process, a compression process, a rolling and scoring process, a chain die process, a rotary die process, and the like.

[0112] The chewing gum substrate may be formed in a variety of different forms, such as, for example, slab, pellet, stick, strip, balls, cubes, center-fill gums, candy gum, multi-region gum, multi-layer gum, bubble gum, deposited gums and compressed gums.

[0113] The chewing gum composition can be prepared using a batch method, a continuous method, or a combination thereof.

[0114] "A continuous mixer" is processing equipment in which the various ingredients used to prepare a composition are fed substantially continuously into the device whilst those ingredients are being mixed and removed or ejected from the mixing apparatus. For example, in a continuous mixing extruder, some ingredients are substantially continuously introduced through various feed ports while others are introduced downstream, all the while the screws, blades or other mixing elements continuing to convey the mixture through the apparatus, all the while mixing the same. At a downstream portion of the extruder, the wholly or partly combined mass is ejected from the extruder by the force of the mass continually being conveyed and/or facilitated by an external pump.

Confectionery

[0115] The confectionery substrate can include a chewable confectionery such as gummy or "gummi" candy, gum drops, licorice, fruit snacks, starch based jellies, gelatin based jellies, pectin based jellies, carageenan based jellies, agar based jellies, konjac based

jellies, starch candy, nougat, toffee, taffy, marshmallow, fondant, fudge, chocolate, marzipan, and jelly beans. The confectionery substrate may also include harder candies such as, but not limited to, compressed tablets, hard boiled candy, nut brittles, pastilles, pralines, dragees, and lozenges. The base of the confectionery may be a sugar/glucose syrup combination or a sugar polyol/sugar polyol syrup combination and a gelatinizing agent, the latter of which may be gelatin, agar, gum arabic, maltodextrin, pectin, modified starches or a combination thereof. Various other gums (also referred to as hydrocolloids) may also be used. The gelatinizing material may be desirably dissolved in water or otherwise hydrated prior to mixing with the sugar/glucose syrup combination or the sugar polyol/sugar polyol syrup combination. If a hydrocolloid such as pectin is used as the gelatinizing agent, then the pectin is desirably dry mixed with a portion of the sugar or bulk sweetener prior to addition of the dry mixture to water. Methods of making the foregoing confectionery substrate are provided in the art.

[0116] In an embodiment, preparation of a particulate coated confectionery includes the step of forming a confectionery composition substrate comprising a surface; applying the food grade adhesive to at least a portion of the surface of the confectionery composition substrate; applying a particulate coating composition to at least a portion of the adhesive coating; optionally allowing the adhesive to dry to form a particulate coated confectionery product; and packaging the product. The applying and coating steps can be performed on individual confectionery pieces or on a confectionery sheet that can later be processed into individual confectionery pieces.

[0117] The optional step of forming the confectionery into individual pieces prior to coating may be performed, if desired. Any desired means to form the individual pieces may be used, including, but not limited to extrusion, rolling, scoring, rope cutting, casting, molding, or a combination thereof.

Texture Analysis

[0118] The particulate coated chewing gum product exhibits different chew textures and mouthfeel compared to traditional chewing gum. Various analytical tests were developed to characterize the difference between the particulate coated chewing gum product and traditional chewing gum at the initial bite and from initial bite to chew.

[0119] The particulate coated chewing gum product has an initial chew texture that is more crunchy or otherwise different than traditional chewing gum. This provides a new and pleasing experience to the consumer. To quantitatively characterize “initial crunch”, an Initial Crunch Texture Analyzer Test (or just “Texture Analyzer Test”) as set out in Example

6 can be conducted. In general, the Texture Analyzer Test is conducted using a texture analyzer equipped with a 2 millimeter (mm) probe (cylinder, length of 25 mm) at a 1 millimeter/second probe speed and 95% probe penetration (95% of sample is being penetrated with the probe in the direction of the applied force), eight runs per sample type, and the results are provided as stress versus probe penetration (%) or stress-strain curves.

[0120] The stress versus probe penetration (%) curves (alternatively referred to as "stress-strain curves") for the particulate coated chewing gum product differs significantly from traditional chewing gum, such as traditional uncoated slab or stick formats or hard panned coated chewing gum pellets. The traditional uncoated slab gum exhibit stress-strain curves having generally positive slopes (see e.g. Figure 1B dashed line) and no peaks, i.e. local maxima of stress present as in the stress-strain curves of particulate coated chewing gum product (see e.g. Figure 1B, solid lines). A "peak" has a positive slope on one side and a negative slope on the other side. The shape and magnitude of the peaks will vary and depend on type (size, shape, composition) and amount the particulate coating composition. The peaks or variations in the curves represent chew resistance and correlate to the different senses perceived when a consumer performs a single bite on a sample.

[0121] In an embodiment, the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test where there are at least two positive slopes and at least one negative slope in a stress versus probe penetration (%) curve.

[0122] In an embodiment, when tested with a sample orientation having the particulate coating facing down, the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test where there is at least one negative slope that covers a stress range of at least 0.5 million pascals, specifically at least 0.75 million pascals, and more specifically at least 1.0 million pascals. The "at least one negative (downward) slope covering a range of at least x million Pa" means the stress is reduced by at least x million pascals from a peak of a negative slope to where the curve changes to a positive slope or the curve ends.

[0123] In an embodiment, when tested with a sample orientation having the particulate coating facing down, the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test that requires at least 2 million pascals stress during the first 10% of probe penetration into the product, specifically at least 2.5 million pascals.

[0124] In an embodiment, when tested with a sample orientation having the particulate coating facing down, the particulate coated chewing gum product has an initial

crunch characteristic determined by the Texture Analyzer Test where there is a stress peak of at least 2 million pascals between 10% and 30% probe penetration into the product, specifically at least 3 million pascals, more specifically at least 4 million pascals, and yet more specifically at least 5 million pascals between 10% and 30% probe penetration into the product.

[0125] It was found that the particulate chewing gum product exhibits characteristic properties in a Brabender Torque Test compared to traditional chewing gum due to the combination of the chewing gum substrate and the particulate coating composition. The Brabender Torque Test is described in Example 7 below and can be used to analyze the texture transition from first crunch to chew of a sample. The Brabender Torque Test is generally conducted by loading 40-50 grams of sample into a Brabender Do-Corder mixer equipped with roller mixing blades for dry mixing. Mixing is conducted at 15 revolutions per minute "RPM" and 25 °C and torque resistance to deformation is measured over a period of five minutes. Six runs per sample are performed.

[0126] In an embodiment, the particulate coated chewing gum product has a chew characteristic determined by a Brabender Torque Test wherein i. there are multiple (e.g. 2, 3, 4 or more) torque fluctuations within the first five minutes; or ii. a percent increase in torque is greater than or equal to 8, specifically greater than or equal to 10, or more specifically greater than or equal to 12, or iii. a combination of i and ii; wherein the Brabender Torque Test provides results as torque versus time and is conducted by loading 40-50 grams of sample into a Brabender Do-Corder mixer equipped with roller mixing blades for dry mixing; mixing is conducted at 15 RPM and 25 °C and torque resistance to deformation is measured over a period of five minutes; six runs per sample are performed. Within this embodiment, the particulate coated chewing gum product is free of a hard panned coating. Within this embodiment, the particulate coated chewing gum product has a non-uniform cross section, with the particulate coating composition covering only a portion of the chewing gum substrate. Specifically, the particulate coated chewing gum product is not a traditional, uncoated slab chewing gum and is not a traditional hard coated chewing gum.

[0127] In an embodiment, the particulate coated chewing gum or confectionery product has a surface roughness of greater than 700 micrometers for the surface with the particulate coating composition, specifically greater than 800 micrometers, specifically about 800 to about 2000 micrometers, more specifically about 900 to about 1800 micrometers, yet more specifically about 1000 to about 1600 micrometers, and still yet more specifically about 1100 to about 1400 micrometers. The surface roughness can be measured using a

profilometer and reported as an average peak-to-valley difference in micrometers as in Example 8.

[0128] The cohesiveness of the chew for the particulate chewing gum product can be analyzed using a Brabender Smear Test involving mechanically chewing the product, smearing the resulting chewed material on a surface and analyzing for discontinuities (i.e. holes) in the spread material. "Cohesiveness" is defined as how well a mass of material will stick to itself without falling apart. The particulate coated chewing gum product, when initially chewed, has a product mass that tends to fall apart, that is it is less cohesive. Over time, with additional chewing, the cohesiveness increases. This provides the consumer with different texture experiences in different portions of the mouth resulting in a more exciting chew.

[0129] The Brabender Smear Test can be conducted according to the procedure in Example 9. In an embodiment the Brabender Spear Test is conducted by loading 120-280 grams of sample (objective is to put in enough sample to fill the head without it running empty or partially full) into a 60-90cc Brabender mixer equipped with Sigma blades while the mixer is on, which takes about 3-5 minutes and then conducting mechanical chewing for up to 14 minutes at 40 RPM, 21-24 °C, water flow, circulator pump at 80 milliliters/minute. The mechanically chewed material is dried on a weighing dish for 2-3 minutes at room temperature and then 50 grams of the chewed material is spread over laminated paper (can be laminated graph paper such as Crystine Cover Gloss White 14 PT 8-1/2x 11 Grain Short 150/ Ream) using a Smear Test Apparatus described in Example 9. The Smear Test Apparatus (5) as illustrated in Figures 7A (top view), 7B (front view), and 7C (side view) includes a base plate (10) having a test paper catch (20) that firmly holds the laminated paper (not shown in the figures) on the surface of the base plate (10). Connected to the base plate (10) is a left rail (30a) and a right rail (30b). Each rail has a groove the length of the rail where the base plate fits in placing the base plate at an angle which slopes down toward the test paper catch (20). A slide (40) is attached to a left slide bearing (50a) and a right slide bearing (50b) allowing the slide (40) to sit atop and span the width of the Apparatus (5). The slide (40) has a slide blade (100) on the bottom side, the slide blade (100) having a generally triangular shape with the thinnest point of about 1 mm thick (Figure 8A, 100). Figure 8A is a bottom view of the slide (40) where the side with the slide blade (100) point is placed nearest to the test paper catch (20) and the side with the largest part of the gap towards the chewed sample (1). The slide (40) can be slid over the top of the rails and the angle of the groove in the rails results in a gap between the bottom of the slide (40) and the top of the base plate (10) of about 3 mm

nearest the test paper catch (20) and a gap reaching about 0 mm at the end furthest from the test paper catch (20). Left (60a) and right handles (60b) attached to the slide (40) allows for an operator to draw the slide (40) over the chewed sample (1) by applying a sufficient downward and sliding force to smear a 50 gram quantity of chewed sample (1) across the surface of the laminated paper to achieve a smeared sample (not shown in Figure) having a length of 18 cm, a thickness of about 6 mm at the end closest to the start of the smear (closest to the test paper catch (20)) and a thickness of about 2 mm at the end furthest from the start of the smear (furthest from the test paper catch (20)). The time it takes to smear the sample is about 4-5 seconds. Figure 7A illustrates the direction of the draw. The smeared sample on the paper and the paper are removed from the test apparatus together and the smeared sample is analyzed for the presence of particulates and discontinuities. General dimensions of the Smear Test Apparatus (5) are summarized in Table 7 below.

[0130] In an embodiment, the particulate coated chewing gum product when analyzed in a Smear Test exhibits discontinuities after 10 minutes or after 14 minutes of mechanical chewing, wherein the Smear Test is conducted by loading 120-280 grams of sample into a 60-90cc Brabender mixer equipped with Sigma blades and conducting mechanical chewing for up to 14 minutes at 40 RPM, 21-24 °C, water flow, circulator pump at 80 milliliters/minute; "discontinuities" means a hole in the smeared sample that is at least .05 inches (12.7 millimeters) long measured in one direction.

[0131] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface; wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there are at least two positive slopes and at least one negative slope in a stress versus probe penetration (%) curve, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

[0132] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface; wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there is at least one negative slope that covers a stress range of at least 0.5, at least 0.75, or at least 1.0 million pascals, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

[0133] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface, wherein the particulate coated chewing gum product has an initial crunch

characteristic determined by a Texture Analyzer Test that requires at least 2 million pascals stress during the first 10% of probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

[0134] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface;, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test where there is a stress peak of at least 2 million pascals, at least 3 million pascals, at least 4 million pascals, or at least 5 million pascals between 10% and 30% probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

[0135] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface; wherein the particulate coated chewing gum product has a chew characteristic determined by a Brabender Torque Test wherein i. there are multiple torque fluctuations within the first five minutes, or ii. a percent increase in torque is greater than or equal to 8, or iii. a combination of i and ii, wherein the Brabender Torque Test provides results as torque versus time.

[0136] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface; wherein the particulate coated chewing gum product when analyzed in a Smear Test exhibits discontinuities after 10 minutes or after 14 minutes of mechanical chewing.

[0137] In an embodiment, a particulate coated chewing gum product comprises a chewing gum substrate comprising a surface; and a particulate coating composition adhered to the surface; wherein the product has a surface roughness of greater than 800 micrometers for the surface with the particulate coating composition as measured using a profilometer.

[0138] The features and advantages are more fully shown by the following examples which are provided for purposes of illustration, and are not to be construed as limiting the invention in any way.

EXAMPLES

Example 1: Particulate coated chewing gum using polyvinyl acetate adhesive

[0139] Polyvinyl acetate (Mw 8,500-15,000) having a softening point of about 65-70 °C was heated to a temperature of 92 °C to form a food grade adhesive in molten form. Color glitter (available from Watson Inc.) was mixed with the molten polyvinyl acetate. Using a spatula, a thin layer of the molten polyvinyl acetate/glitter mixture was applied to the surface of a pre-made slab of chewing gum. The coating was allowed to dry. The coating dried in less than three minutes and functioned as a very good binder for the glitter particles. The dry time was fast and the application was easy and convenient. The resulting coating gave a glossy, shiny appearance to the surface of the chewing gum.

Example 2: Particulate coated chewing gum using polyvinyl acetate adhesive, dual coating

[0140] Molten polyvinyl acetate was prepared as in Example 1. A thin layer of the molten food grade adhesive was applied to the surface of a pre-made chewing gum slab. Fruit powder was then applied to the surface of the adhesive layer and the powder was pressed onto the chewing gum surface. A thin layer of molten food grade adhesive ("second food grade adhesive coating") was then applied on top of the fruit powder-coated chewing gum surface. Immediately following the second food grade adhesive application, isomalt particles (about 200-500 micrometers) were applied to the surface of the chewing gum, on top of the second food grade adhesive coating. The sample was then allowed to dry.

[0141] The coating dried in less than three minutes and functioned as a very good binder for both the fruit powder and the isomalt particles, which did not fall off the sample after drying. The dry time was fast and the application was easy and convenient.

Example 3. Particulate coated chewing gum using gum base adhesive

[0142] Gum base prepared from an elastomer, filler, and softener was heated to 100 °C to form a molten mass. Using a spatula, a thick (about 0.5-1 mm) layer of gum base was applied to the surface of a pre-made chewing gum slab. Immediately following the application of the molten gum base adhesive coating, the strip of chewing gum is pressed onto isomalt particles (about 200-500 micrometers) in a container to adhere the particles to the adhesive coating. The gum base adhesive dried in 3-4 minutes and provided a very effective binder for the particles.

Example 4. Particulate coated chewing gum using wood resin adhesive

[0143] A wood resin adhesive is sprayed on top of a pre-made slab of chewing gum. Particulate coating ingredients such as isomalt particles are spread on top of the adhesive layer. An application of adhesive is then sprayed on top of the particulate coating ingredients. This second application of adhesive is beneficial when using large, coarse particulate coating ingredients. The adhesive represents from 1 to 5% of the product weight.

Example 5. Particulate coated chewing gum using wood resin adhesive

[0144] Pre-made slabs of sugarfree chewing gum having dimensions of about 30 to about 40 millimeter (mm) long, about 4.5 to about 6.5 mm thick, and about 10 to about 15 mm wide were coated with a thin layer of pine tree wood resin adhesive. Isomalt particles were spread on top of the adhesive layer and the samples are allowed to dry. The ingredients and amounts are set out in Table 1.

Table 1.

Example 5	
Ingredients	**Amount (weight %)**
Sugarfree gum	90.74%
Food Grade Adhesive: Magic Glue- Colla N 140063 (DOMCA Spain)	2.26%
Isomalt Particles	7.00%
Total weight	100%

Comparative Example 1. Particulate coated chewing gum using molten polyol

[0145] Xylitol was heated to a temperature of 91 °C to form a melt. Color glitter (5 wt%; Watson Inc.) was mixed with the molten xylitol to form a molten xylitol/glitter mixture. Using a spatula, a thin layer of the molten xylitol/glitter mixture was applied to the surface of a pre-made slab of chewing gum. The coating was allowed to dry. The coating dried in less than five minutes and functioned as a very good binder for the glitter particles. The resulting coating provided good crunch and cooling effect, however once the coating dried, the product was very difficult to cut as the surface cracked.

Comparative Example 2. Particulate coated chewing gum using gum arabic solution

[0146] A 30% gum arabic solution was prepared using water as the solvent. A thin layer of the gum arabic solution was applied to the surface of a pre-made slab of chewing gum. Once the gum arabic solution was applied, isomalt particles (about 200-500 micrometers) were applied to the surface of the chewing gum, on top of the gum arabic coating, and then the particles were pressed onto the chewing gum surface. The sample was then allowed to dry. The drying time took more than two and a half days.

Comparative Example 3. Particulate coated chewing gum using maltitol syrup

[0147] A thin layer of maltitol syrup (80%) was applied to the surface of a pre-made slab of chewing gum. Once the maltitol syrup was applied, fruit powder (about 50-1000 micrometers) was applied to the surface of the chewing gum, on top of the maltitol syrup coating and then the powder was pressed onto the chewing gum surface. Immediately after applying the fruit powder, isomalt particles (about 200-500 micrometers) were pressed onto the surface of the chewing gum, on top of the maltitol syrup and fruit powder coating, using a roller to ensure the particle adhered well to the chewing gum surface. The sample never completely dried.

Comparative Example 4. Particulate coated chewing gum using low melting point fat

[0148] A low melting point fat was heated to 72 °C for form a melt. A thin layer of the melted fat was applied to the surface of a pre-made slab of chewing gum and then isomalt particles (about 200-500 micrometers) were applied onto the surface. The low melting point fat did not function as a good adhesive as the particles would not adhere to the surface of the chewing gum.

Comparative Example 5. Particulate coated chewing gum using gelatin

[0149] A 33% gelatin in water solution was prepared. A thin layer of the gelatin solution was applied to the surface of a pre-made slab of chewing gum and then isomalt particles (about 200-500 micrometers) were applied onto the surface. A roller was used to press the particles down onto the chewing gum surface and then the sample was allowed to dry. The gelatin solution did not function well as a binder to adhere the particles to the chewing gum surface.

Example 6. Initial Crunch, Texture Analyzer Test

[0150] The particulate coated chewing gum product of Example 5 was analyzed for initial crunch using a method that can both qualitatively and quantitatively differentiate between the initial texture for the sample compared to four comparative chewing gum samples as set out in Table 2.

Table 2.

Comparative samples	**Description**
"Comparative mint/melon chewing gum" or "C1"	Trident® Layers™ CoolMint+Melon Fresco, a chewing gum having two outer layers of chewing gum material sandwiching a center layer of flavored candy 1 stick = 2.5 grams, Ingredients: Gum base, maltitol, maltitol syrup, sorbitol, mannitol, natural and artificial flavoring, less than 2% of acesulfame potassium, aspartame, blue 1, blue1 lake, gelatin, partially hydrogenated coconut oil, soy lecithin, sucralose and yellow 5.
"Comparative chewing gum with inclusions" or "C2"	Ice Breakers™ Ice Cubes Spearmint, cube-shaped chewing gum containing "flavor crystals"; Ingredients: xylitol, gum base, maltitol syrup, mannitol, contains 2% or less of: natural and artificial flavor, gum acacia, maltodextrin, soy lecithin, artificial color (blue 1 lake, yellow 5 lake, blue 1, yellow 5), aspartame, gelatin, acesulfame potassium, neotame, BHT, and sucralose.
"Comparative mint pellet chewing gum" or "C3"	Dentyne Ice™, Mint Frost a hard coated pellet chewing gum, 1 piece = 1.5 grams, Ingredients: sorbitol, gum base, maltitol, mannitol, artificial and natural flavoring, less than 2% of: acacia, acesulfame potassium, aspartame, BHT, candelilla wax, glycerin, soy lecithin, sucralose, and titanium dioxide.
"Comparative spearmint slab chewing gum" or "C4"	STRIDE™ Spearmint Traditional slab chewing gum, 1 stick = 1.9 grams Ingredients: sorbitol, gum base, glycerin, mannitol, xylitol, natural and artificial flavoring, less than 2% of: acesulfame potassium, aspartame, BHT, blue 1 lake, soy lecithin and yellow 5 lake.

[0151] Initial Crunch, Texture Analyzer Test: The initial crunch of the samples was measured using a texture analyzer (TA.XT.Plus Texture Analyser from Stable Micro Systems) with a 2 mm probe (cylinder, length of 25 mm) at a 1 millimeter/second probe speed and 95% probe penetration (95% of sample is being penetrated with the probe in the direction of the applied force). The sample of Example 5 was tested in two orientations 1) particulate coating composition side facing up so that this side was penetrated by the probe first; and 2) particulate coating composition side facing down so that the side without

particulate coating was penetrated by the probe first. For the Comparative Samples, the obvious top and bottom sides were identical to one another. The sample is analyzed and the force resistance of samples is recorded as a function of time and/or penetration. The results are reported in stress versus probe penetration (%) curves. Eight runs per sample type were performed.

[0152] The stress versus probe penetration (%) curve for traditional uncoated, slab chewing gum behaves like the dashed line shown in Figure 1B. The curve does not show any anomalies. The stress increase at large probe penetration (>90%) is related to the probe compressing the material against the platen.

[0153] The "stress-strain" curves for the samples of chewing gum of Example 5 are depicted in Figure 1A (particulate coating composition side facing up) and Figure 1B (particulate coating composition side facing down), as solid lines. On average the curves in Figure 1B have at least 2 positive slopes and 1 negative slope in the stress versus probe penetration (%) curve. Probe penetration % is the percent of the thickness through which the probe has penetrated into the sample in the direction of the applied force. The shape and magnitude of the peaks will vary and depend on type (size, shape, composition) and amount the particulate coating composition. The peaks correlate to the different senses perceived when a consumer performs a single bite on a sample. For all samples the stress increases as 100% strain is reached due to the fact that the probe is approaching the surface of the platen.

[0154] The results of the Initial Crunch, Texture analyzer Test are provided in Table 3 for Example 5 along with the results for the comparative chewing gum samples C1-C4. The reported results take into account an average of the results from the eight runs tested for each sample. Figures 1-4 are the stress-strain curves.

[0155] In Table 3, the "Range 20% to 80%, in million Pa" means the highest stress value minus the lowest stress value reported in million Pascals in the portion of the stress versus probe penetration (%) curve that corresponds to 20% to 80% probe penetration.

[0156] The stress versus probe penetration (%) curves may have both negative (downward) and positive (upward) slopes. In Table 3, the question "Are there at least 2 positive slopes and at least one 1 negative slope?" means in the stress versus probe penetration (%) curve are there at least 2 positive (upward) slopes and at least one negative (downward) slope?

[0157] In Table 3, the question "Is there at least one negative (downward) slope covering a range of at least 1 million Pa?" asks if the stress is reduced by at least 1 million

Pascals from a peak of a negative slope to where the curve changes to a positive slope or the curve ends.

[0158] In Table 3, the question "Is at least 2 million Pa stress required between 0 and 10% probe penetration?" asks if the highest stress value between 0 and 10% probe penetration into the sample is at least 2 million pascals.

[0159] In Table 3, the question "Is there a stress peak of at least 2 million Pa between 60 and 90% probe penetration?" asks if the highest stress value between 10 and 30% probe penetration into the sample is at least 2 million pascals.

Table 3.

Sample	**Example 5 Particulate coating face up**	**Example 5 Particulate coating face down**	**C1**	**C2**	**C3**	**C4**
Range 20% to 80%, in million Pa [high minus low]	At least 1.5	At least 3	Less than 1.5	Less than 0.5	Less than 6	Less than 2
Are there at least 2 positive slopes and at least 1 negative slope?	yes	yes	no	yes	yes	no
Is there at least one negative (downward) slope covering a range of at least 1 million Pa?	no	yes	no	no	yes	no
Is at least 2 million Pa stress required between 0 and 10% probe penetration?	no	yes	no	no	yes	no
Is there a stress peak of at least 2 million Pa between 10 and 30% probe penetration?		yes	no peak	no	yes	no peak

[0160] As shown in Figures 1A and 1B, the Example 5 particulate coated chewing gum product stress-strain curves exhibit distinct traces as compared to the curve for a conventional chewing gum sample (C4) shown as a dashed line in Figure 1B.

[0161] The results of the comparative chewing gum samples C1-C4 are shown in Figures 2-4. C1 and C4 differ from the particulate coated chewing gum product by the complete lack of peaks in the stress-strain curve (Figure 2). C2 (Figure 3), which is

advertised as containing "flavor crystals", exhibits some minor peaks, but the magnitude is much smaller than what is exhibited by the particulate coated chewing gum product (Figures 1A and 1B). The hard coated pellet gum C3 (Figure 4) is the only comparative sample showing the presence of a peak in the stress-strain curve, which is due to the hard outer coating that completely surrounds the chewing gum pellet.

Example 7. Crunch to Chew, Brabender Torque Test

[0162] Samples of the particulate coated chewing gum product of Example 5 and comparative chewing gum samples as set out in Example 6 were analyzed for texture transition from first crunch to chew using a Brabender Torque Test. The method involves continuously mixing/deforming samples in a Brabender Do-Corder mixer to measure the resistance to deformation. Torque resistance to deformation was measured and recorded. The method can both qualitatively and quantitatively differentiate between the texture for samples of traditional chewing gum and the particulate coated chewing gum product. The qualitative differentiation is manifested by fluctuations and "events" on the Torque-Time curves. The quantitative differentiation is a measure of percent increase in torque value from torque at start [(Max Torque – Initial Torque)/Initial Torque]x100. The experimental parameters are set out in Table 4. A minimum of 6 runs per sample were performed.

Table 4.

Water flow:	No water, dry mixing
Sample loading:	All sample loaded before the start
Sample weight:	40-50 grams
Mixing screws:	Roller mixing blades
Temperature:	25 °C

[0163] The results for the most representative run are reported in Table 5, all torque values are in newton meter (N.m). "% increase in torque" means [(Maximum Torque – Initial Torque)/Initial Torque]x100 between time zero and 5 minutes; a zero value means the maximum and initial torque are equal. "% variation in torque max:min" means ([(Maximum Torque – Minimum Torque)/Minimum Torque]x100 between time zero and 5 minutes).

Table 5.

Sample	**Example 5**	**C1**	**C2**	**C3**	**C4**
Initial torque (N.m)	164	179	157	194	254

Sample	Example 5	C1	C2	C3	C4
Torque at 5 minutes (N.m)	122	111	130	152	122
Maximum torque N.m within first 5 minutes (N.m)	184	179	164	234	254
Minimum torque within first 5 minutes (N.m)	118	110	130	152	122
% increase in torque	12	0	4	21	0
% variation in torque max:min	56	63	26	54	>100

[0164] The particulate coated chewing gum product exhibits torque fluctuations manifested for about two minutes as shown in Figure 5. A torque increase is observed followed by fluctuations and then by the smooth decrease to a plateau value. This behavior is visually very different than the Comparative Samples C1, C2, and C4. The % increase in Torque = 12% which is higher than all the Comparative Samples except C3 which is a hard coated pellet chewing gum. Traditional chewing gum samples exhibit traces as shown in Figure 5 which are relatively smooth, lacking the fluctuations observed for the particulate coated chewing gum product. The torque fluctuations can be linked to the differences in consumer perception of texture while chewing, such as transition from a crunchy to a chewy texture.

Example 8. Surface Roughness, Profilometer Test

[0165] Samples of the particulate coated chewing gum product of Example 5 and comparative chewing gum samples as set out in Example 6 were tested for surface roughness using a Mitutoyo profilometer (SURFTEST SV-3100). The particulate coated chewing gum product exhibits an anomalous and rough surfaces. Thus, the parameter of interest was the distance between an upper peak (Point 1) and a lower valley (Point 2) of the surface (See Figure 6 Surface Roughness). For each product type, five samples were used and three measurements were taken on each sample for a total of fifteen measurements for each product type. For each measurement, the probe (starting point) was placed on a different point on the sample. A scan speed of 0.5 millimeter/second was used and the scan length was 4 mm or 12 mm for larger samples. The obvious top surface of the sample was scanned. The average Peak-to-Valley difference micrometers along with the standard deviation are provided in Table 6.

Table 6.

Sample	Example 5	C1	C2	C3	C4
Top surface, micrometers	1160	215	522	*	232
STD Dev	241	65	189		14

* Not measured due to the presence of a smooth hard panned coated surface.

[0166] As can be seen by the results, the particulate coated chewing gum product has significantly more surface anomalies compared to traditional chewing gum such as Comparative Sample C4 or even or the Comparative Sample with inclusions C2.

Example 9. Duration of Crunch, Brabender Smear Test

[0167] The particulate coated chewing gum product of Example 5 and comparative chewing gum samples as set out in Example 6 were tested for duration of crunch using a Brabender Smear Test involving mechanical chewing of the sample in a Brabender. At various time intervals of mechanical chewing, the samples of particulate coated chewing gum product can be visually compared to mechanically chewed conventional chewing gum control samples.

[0168] The test involves added sample to a 60-90cc Brabender (Brabender Type: C.W. Brabender, Prep Center, Serial # 586/PE, Type # D-51-T; C.W. Brabender mixing head Type #R.E.E.6/3 230V 15A, Serial Number # A.A. 1237 S.B. with Head Capacity of 60-90 cubic centimeter) and mechanically chewing the sample for 2, 6, 10, and 14 minutes according to the parameters set out in Table 7.

Table 7.

Water flow:	Circulator pump at 80 milliliters/minute
Sample loading:	All sample loaded before the start
Sample weight:	120-280 grams, to ensure a full mixing head with samples
Mixing screws:	Sigma blades
Temperature:	21-24 °C
RPM:	40

[0169] The procedure involves setting up the circulation pump so one circulation line end is in the clean water pumping it in to the Brabender head, and a second line end is at the Brabender head pumping the water out of the Brabender head to a waste container.

[0170] The circulation pump is turned on, and as the pumps starts, the sample loading is started. Turn the Brabender drive on and set it at 40 RPM going forward. Weigh the appropriate sample amount into weighing dish (sample size will vary based on the sample type and shape – what is needed is enough samples to fill the head without it running empty or partially full). Using a timer – within 3-5 minutes load the samples into the Brabender head while the Brabender is running. The time will vary based on the gum type, format, and shape, but will remain constant within the same type. Once the sample is completely added, reset the timer and this will be considered the start time, i.e. the point in time where the chewing process with the Brabender is started. The sample will be chewed for 2 minutes, 6 minutes, 10 minutes, and 14 minutes from the time the sample was completely added to the Brabender head (the start time). Each time point will require fresh sample from start to end. Once the sample is chewed for the time point (2, 6, 10, or 14 minutes), the chewed sample is removed from the Brabender head carefully. Chewed samples are to be dried by placing on a weighing dish for 2-3 minutes at room temperature.

[0171] Once the time interval of mechanical chewing has been achieved, about 50 grams of the chewed sample (1) is placed on the surface of a laminated graph paper (Crystine Cover Gloss White 14 PT 8-1/2x 11 Grain Short 150/ Ream) held in a Smear Test Apparatus. The Smear Test Apparatus (5) as illustrated in Figures 7A (top view), 7B (front view), and 7C (side view) includes a base plate (10) having a test paper catch (20) that firmly holds the laminated paper (not shown in the figures) on the surface of the base plate (10). Connected to the base plate (10) is a left rail (30a) and a right rail (30b). Each rail has a groove the length of the rail where the base plate fits in placing the base plate at an angle which slopes down toward the test paper catch (20). A slide (40) is attached to a left slide bearing (50a) and a right slide bearing (50b) allowing the slide (40) to sit atop and span the width of the Apparatus (5). The slide (40) has a slide blade (100) on the bottom side, the slide blade (100) having a generally triangular shape with the thinnest point of about 1 mm thick (Figure 8A, 100). Figure 8A is a bottom view of the slide (40) where the side with the slide blade (100) point is placed nearest to the test paper catch (20) and the side with the largest part of the gap towards the chewed sample (1). The slide (40) can be slid over the top of the rails and the angle of the groove in the rails results in a gap between the bottom of the slide (40) and the top of the base plate (10) of about 3 mm nearest the test paper catch (20) and a gap reaching

about 0 mm at the end furthest from the test paper catch (20). Left (60a) and right handles (60b) attached to the slide (40) allows for an operator to draw the slide (40) over the chewed sample (1) by applying a sufficient downward and forward sliding force to smear a 50 gram quantity of chewed sample (1) across the surface of the laminated paper to achieve a smeared sample (not shown in Figure) having a length of 18 cm, a thickness of about 6 mm at the end closest to the start of the smear (closest to the test paper catch (20)) and a thickness of about 2 mm at the end furthest from the start of the smear (furthest from the test paper catch (20)). The time it takes to smear the sample is about 4-5 seconds. Figure 7A illustrates the direction of the draw. The smeared sample on the paper and the paper are removed from the test apparatus together and the smeared sample is analyzed for the presence of particulates and discontinuities. General dimensions of the Smear Test Apparatus (5) are summarized in Table 8.

Table 8.

Part	**Dimension**
Base Plate (10)	Length 12 inches; width 9 inches; thickness 0.5 inches
Left Rail (30a)	Length 12 inches; Groove dimensions in Figure 9 in inches
Right Rail (30b)	Length 12 inches; Groove dimensions similar to Figure 9, mirror image
Slide (40)	Length 11.25 inches, Width 1.475 inches
Slide blade (100)	Height 0.961 inch, angle 19 degrees (Figure 8B)

[0172] Cohesiveness of the spread samples are then determined from the smear test. "Cohesiveness" is defined as how well a mass of material will stick to itself without falling apart. In the particulate coated chewing gum product, there is a chewing gum composition substrate and a particulate coating composition. When the product is initially chewed, the product mass tends to fall apart, that is it is less cohesive. With continued chewing and the particulate coating composition is dissolved and consumed, the product becomes more cohesive.

[0173] A summary of the data for the smear test is provided in the Table 9 below. "Discontinuities" means a hole in the smeared sample that is at least .05 inches (12.7 millimeters) long measured in one direction. As shown in the data, the mechanically chewed samples of particulate coated chewing gum product exhibits less cohesion than the comparative chewing gum samples.

Table 9.

Sample	Example 5	C1	C2	C3	C4
Discontinuities after 10 minutes	yes	no	no	no	no
Discontinuities after 14 minutes	yes	no	no	no	no

[0174] As the particulate coated chewing gum product contained discontinuities after 10 and 14 minutes as opposed to the comparative samples, it has been established that there is still a multi-textural effect even at later stages of chewing. Such a multi-textural effect leads to a more dynamic and interesting chew experience for the consumer.

[0175] As used herein the terms "comprising" (also "comprises," etc.), "having," and "including" is inclusive (open-ended) and does not exclude additional, unrecited elements or method steps. The singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. The endpoints of all ranges directed to the same characteristic or component are independently combinable, and inclusive of the recited endpoint. The term "combination" is inclusive of a homogenous or non-homogenous blend, mixture, or alloy of the named components into an integrated whole. The term "homogenous" refers to a uniform blend of the components. The word "or" means "and/or." The terms "first," "second," and the like, "primary," "secondary," and the like, as used herein do not denote any order, quantity, or importance, but rather are used to distinguish one element from another. The terms "front", "back", "bottom", and/or "top" are used herein, unless otherwise noted, merely for convenience of description, and are not limited to any one position or spatial orientation. "Optional" or "optionally" means that the subsequently described event or circumstance may or may not occur, and that the description includes instances where the event occurs and instances where it does not. Reference throughout the specification to "one embodiment", "another embodiment", "an embodiment", and so forth, means that a particular element (e.g., feature, structure, and/or characteristic) described in connection with the embodiment is included in at least one embodiment described herein, and may or may not be present in other embodiments. In addition, it is to be understood that the described elements may be combined in any suitable manner in the various embodiments. In general, the compositions or methods may alternatively comprise, consist of, or consist essentially of, any appropriate components or steps herein disclosed. The invention may additionally, or alternatively, be formulated so as to be devoid, or substantially free, of any components, materials, ingredients, adjuvants, or species, or steps used in the prior art

compositions or that are otherwise not necessary to the achievement of the function and/or objectives of the present claims.

[0176] While the invention has been described with reference to an exemplary embodiment, it will be understood by those skilled in the art that various changes can be made and equivalents can be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications can be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.

CLAIMS

1. A particulate coated chewing gum product, comprising

a chewing gum substrate comprising a surface;

a food grade adhesive at least partially coating the surface of the chewing gum substrate and adhered to the chewing gum substrate surface; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof; and

a particulate coating composition adhered to the food grade adhesive.

2. A particulate coated confectionery product, comprising

a confectionery substrate comprising a surface;

a food grade adhesive at least partially coating the surface of the confectionery substrate and adhered to the confectionery substrate surface; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof; and

a particulate coating composition adhered to the food grade adhesive.

3. The product of claim 1 or 2, wherein the chewing gum substrate and the confectionery substrate are in the form of a slab, stick, strip, or sheet.

4. The product of any one of claims 1-3, wherein

the non-toxic vinyl polymer is a polyvinyl acetate, a partial hydrolysate of a polyvinyl acetate; a polyvinyl alcohol; a vinyl copolymeric elastomer such as a copolymer of vinyl acetate and vinyl laurate, a copolymer of vinyl acetate and vinyl stearate, a copolymer of ethylene and vinyl acetate; or a combination thereof; and

the gum resin or wood resin is a terpene resin; a methyl, glycerol or pentaerythritol ester of rosins or modified rosins and gums; a pentaerythritol ester of partially hydrogenated wood or gum rosin; a pentaerythritol ester of wood or gum rosin; a glycerol ester of wood rosin; a glycerol ester of partially dimerized wood or gum rosin; a glycerol ester of polymerized wood or gum rosin; a glycerol ester of tall oil rosin; a glycerol ester of wood or gum rosin; a partially hydrogenated wood or gum rosin; a partially hydrogenated methyl ester of wood or rosin; or a combination thereof.

5. The product of any one of claims 1-4, wherein the food grade adhesive further comprises a colorant, a flavorant, a food acid or salt thereof, a high intensity sweetener, a sensate, a solvent, or a combination thereof.

6. The product of any one of claims 1-5, wherein the food grade adhesive is present in an amount of about 0.1 to about 15.0 wt% based on the total weight of the product.

7. The product of any one of claims 1-6, wherein the particulate coating composition comprises amorphous saccharide particles, crystalline saccharide particles, amorphous sugar

polyol particles, crystalline sugar polyol particles, baked goods particles, chewing gum particles, colorant powder, colorant flakes, glitter, confectionery particles, dried fruit pieces, food acid particles, fruit granules, fruit powder, nonpareils, nut pieces, or a combination thereof.

8. The product of any one of claims 1-7, wherein the particulate coating composition comprises crystalline sugar polyol particles, dried fruit powder, edible glitter, or a combination thereof.

9. The product of any one of claims 1-8, wherein the particulate coating composition further comprises a food acid or salt thereof, an additional sweetener, a sensate, a flavorant, a flavor modulator or potentiator, a colorant, a functional ingredient, or a combination thereof.

10. The product of any one of claims 1-9, wherein the particulate coating composition comprises particulates having an average particle size of about 10 to about 2000 micrometers.

11. The product of any one of claims 1-10, wherein the particulate coating composition is present in an amount of about 0.1 to about 20.0 wt% based on the total weight of the product.

12. The product of any one of claims 1-11, wherein a second food grade adhesive at least partially coats the adhered particulate coating composition.

13. The product of claim 12, wherein the second food grade adhesive has the same composition as the food grade adhesive at least partially coating the surface of the chewing gum substrate or the confectionery substrate.

14. A method of making a particulate coated confectionery or a particulate coated chewing gum product, comprising:

applying a food grade adhesive to at least partially coat a surface of a substrate; the food grade adhesive is a non-toxic vinyl polymer, a gum resin, a wood resin, a gum base, or a combination thereof, and the substrate is a confectionery or a chewing gum; and

applying a particulate coating composition to form a particulate coated product.

15. The method of claim 14, comprising applying a particulate coating composition to the surface of the food grade adhesive to form the particulate coated product.

16. The method of claim 14, wherein the food grade adhesive and the particulate coating composition are applied to the surface of the substrate at the same time.

17. The method of any one of claims 14-16, further comprising applying a second layer of food grade adhesive after the application of the particulate coating composition.

18. The method of any one of claims 14-17, further comprising applying a second particulate coating composition.

19. The method of any one of claims 14-18, wherein the chewing gum substrate and the confectionery substrate are in the form of a slab, stick, strip, or sheet.

20. The method of any one of claims 14-19, wherein

the non-toxic vinyl polymer is a polyvinyl acetate, a partial hydrolysate of a polyvinyl acetate; a polyvinyl alcohol; a vinyl copolymeric elastomer such as a copolymer of vinyl acetate and vinyl laurate, a copolymer of vinyl acetate and vinyl stearate, a copolymer of ethylene and vinyl acetate; or a combination thereof; and

the gum resin or wood resin is a terpene resin; a methyl, glycerol or pentaerythritol ester of rosins or modified rosins and gums; a pentaerythritol ester of partially hydrogenated wood or gum rosin; a pentaerythritol ester of wood or gum rosin; a glycerol ester of wood rosin; a glycerol ester of partially dimerized wood or gum rosin; a glycerol ester of polymerized wood or gum rosin; a glycerol ester of tall oil rosin; a glycerol ester of wood or gum rosin; a partially hydrogenated wood or gum rosin; a partially hydrogenated methyl ester of wood or rosin; or a combination thereof.

21. The method of any one of claims 14-20, wherein the food grade adhesive further comprises a colorant, a flavorant, a food acid or salt thereof, a high intensity sweetener, a sensate, a solvent, or a combination thereof.

22. The method of any one of claims 14-21, wherein the particulate coating composition comprises amorphous saccharide particles, crystalline saccharide particles, amorphous sugar polyol particles, crystalline sugar polyol particles, baked goods particles, chewing gum particles, colorant powder, colorant flakes, glitter, confectionery particles, dried fruit pieces, food acid particles, fruit granules, fruit powder, nonpareils, nut pieces, a combination thereof.

23. The method of any one of claims 14-22, wherein the particulate coating composition comprises crystalline sugar polyol particles, dried fruit powder, edible glitter, or a combination thereof.

24. The method of any one of claims 14-23, wherein the particulate coating composition further comprises a food acid or salt thereof, an additional sweetener, a sensate, a flavorant, a flavor modulator or potentiator, a colorant, a functional ingredient, or a combination thereof.

25. The product of any one of claims 1-13, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there are at least two positive slopes and at least one negative slope in a stress versus

probe penetration (%) curve, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

26. The product of any one of claims 1-13, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there is at least one negative slope that covers a stress range of at least 0.5, at least 0.75, or at least 1.0 million pascals, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

27. The product of any one of claims 1-13, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test that requires at least 2 million pascals stress during the first 10% of probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

28. The product of any one of claims 1-13, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test where there is a stress peak of at least 2 million pascals, at least 3 million pascals, at least 4 million pascals, or at least 5 million pascals between 10% and 30% probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

29. The product of any one of claims 1-13, wherein the particulate coated chewing gum product has a chew characteristic determined by a Brabender Torque Test wherein

i. there are multiple torque fluctuations within the first five minutes, or

ii. a percent increase in torque is greater than or equal to 8, or

iii. a combination of i and ii,

wherein the Brabender Torque Test provides results as torque versus time.

30. The product of any one of claims 1-13, wherein the particulate coated chewing gum product when analyzed in a Smear Test exhibits discontinuities after 10 minutes or after 14 minutes of mechanical chewing.

31. The product of any one of claims 1-13, wherein the product has a surface roughness of greater than 800 micrometers for the surface with the particulate coating composition as measured using a profilometer.

32. A particulate coated chewing gum product, comprising

a chewing gum substrate comprising a surface; and

a particulate coating composition adhered to the surface;

wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there are at least two positive slopes and at least one negative slope in a stress versus probe penetration (%) curve, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

33. The product of claim 32, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test where there is at least one negative slope that covers a stress range of at least 0.5, at least 0.75, or at least 1.0 million pascals, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

34. The product of claim 32, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by a Texture Analyzer Test that requires at least 2 million pascals stress during the first 10% of probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

35. The product of claim 32, wherein the particulate coated chewing gum product has an initial crunch characteristic determined by the Texture Analyzer Test where there is a stress peak of at least 2 million pascals, at least 3 million pascals, at least 4 million pascals, or at least 5 million pascals between 10% and 30% probe penetration into the product, wherein the Texture Analyzer Test provides results as stress versus probe penetration (%).

36. The product of claim 32, wherein the particulate coated chewing gum product has a chew characteristic determined by a Brabender Torque Test wherein

i. there are multiple torque fluctuations within the first five minutes, or

ii. a percent increase in torque is greater than or equal to 8, or

iii. a combination of i and ii,

wherein the Brabender Torque Test provides results as torque versus time.

37. The product of claim 32, wherein the particulate coated chewing gum product when analyzed in a Smear Test exhibits discontinuities after 10 minutes or after 14 minutes of mechanical chewing.

38. The product of claim 32, wherein the product has a surface roughness of greater than 800 micrometers for the surface with the particulate coating composition as measured using a profilometer.

FIG. 1A.

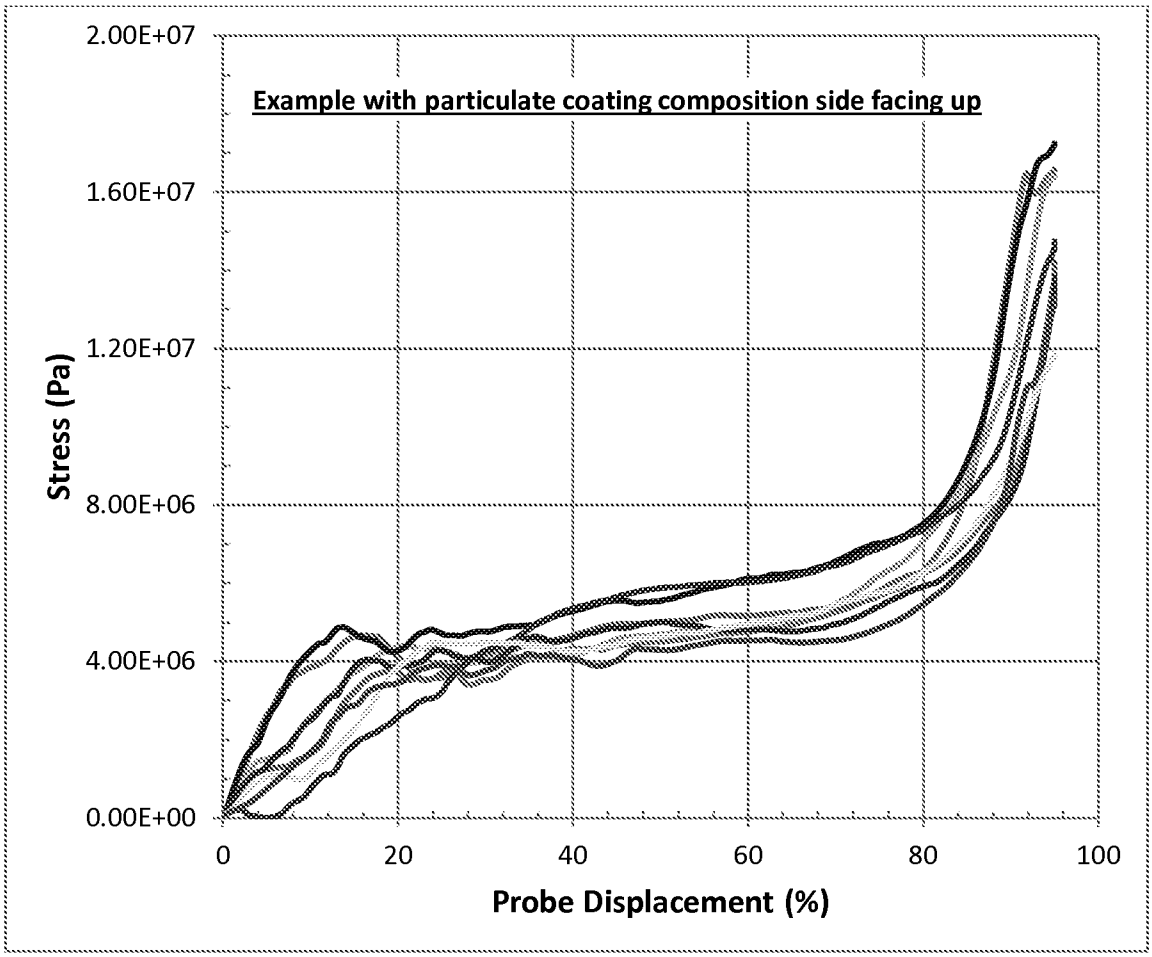

Example with particulate coating composition side facing up
2.00E+07
1.60E+07
1.20E+07
8.00E+06
4.00E+06
0.00E+00
Stress (Pa)
0
20
40
60
80
100
Probe Displacement (%)

FIG. 1B.

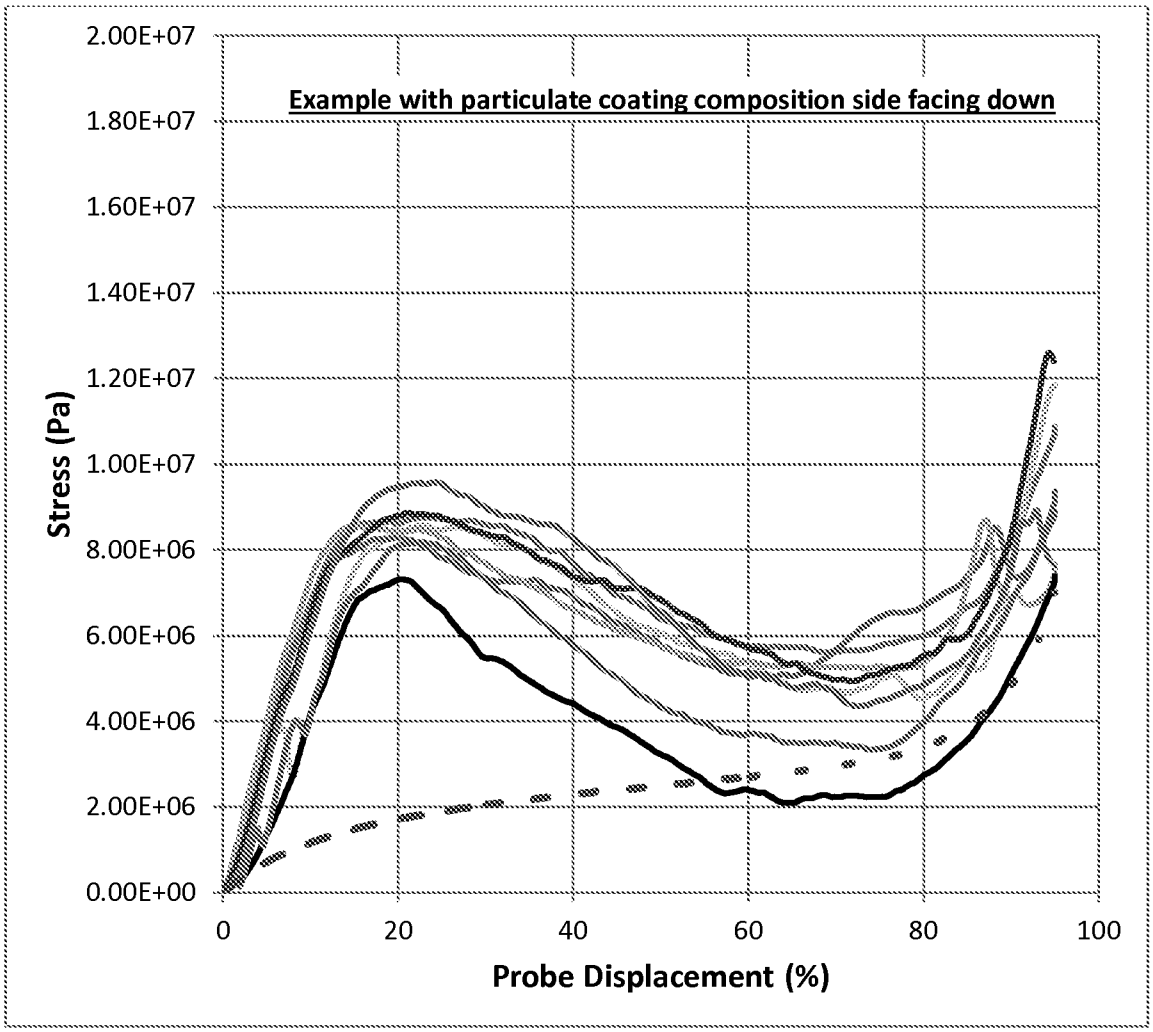

Example with particulate coating composition side facing down
Stress (Pa)
2.00E+07
1.80E+07
1.60E+07
1.40E+07
1.20E+07
1.00E+07
8.00E+06
6.00E+06
4.00E+06
2.00E+06
0.00E+00
0
20
40
60
80
100
Probe Displacement (%)

FIG. 2

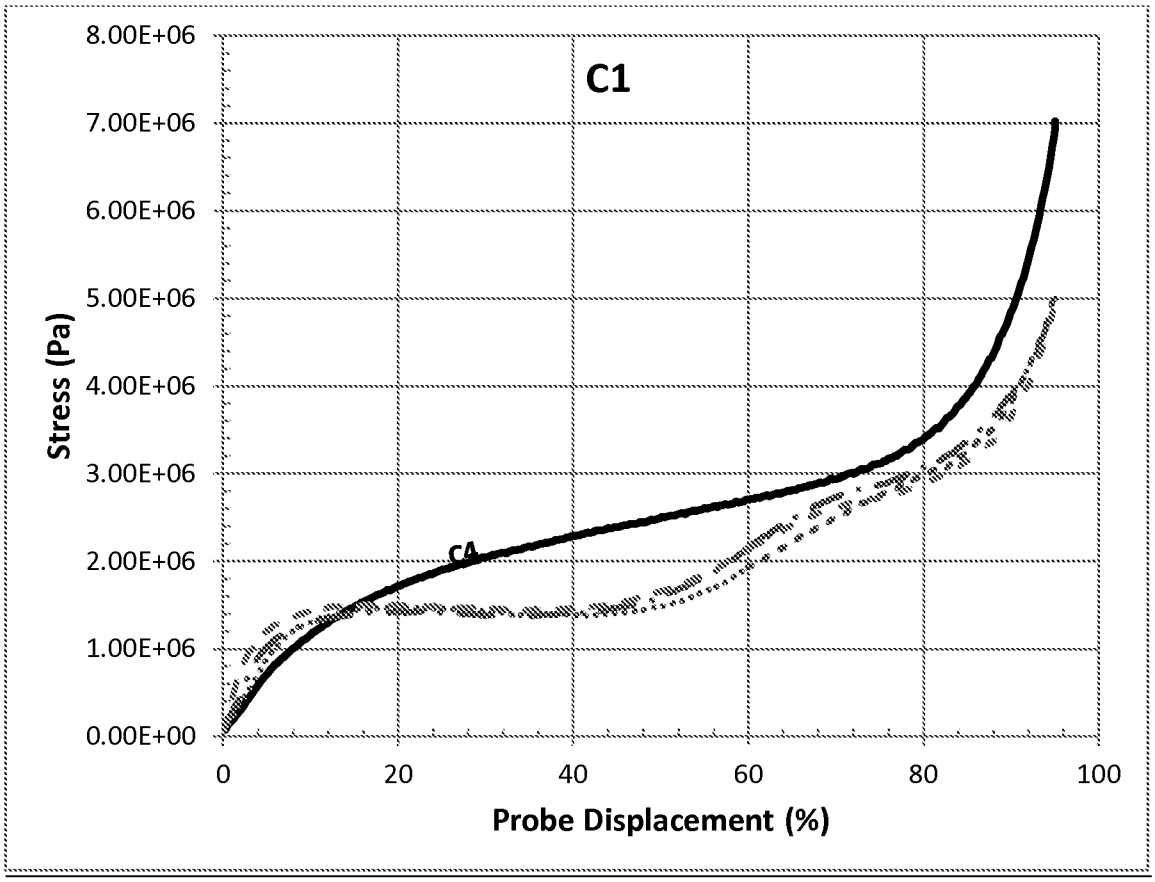

C1
C4
Stress (Pa)
8.00E+06
7.00E+06
6.00E+06
5.00E+06
4.00E+06
3.00E+06
2.00E+06
1.00E+06
0.00E+00
0
20
40
60
80
100
Probe Displacement (%)

FIG. 3

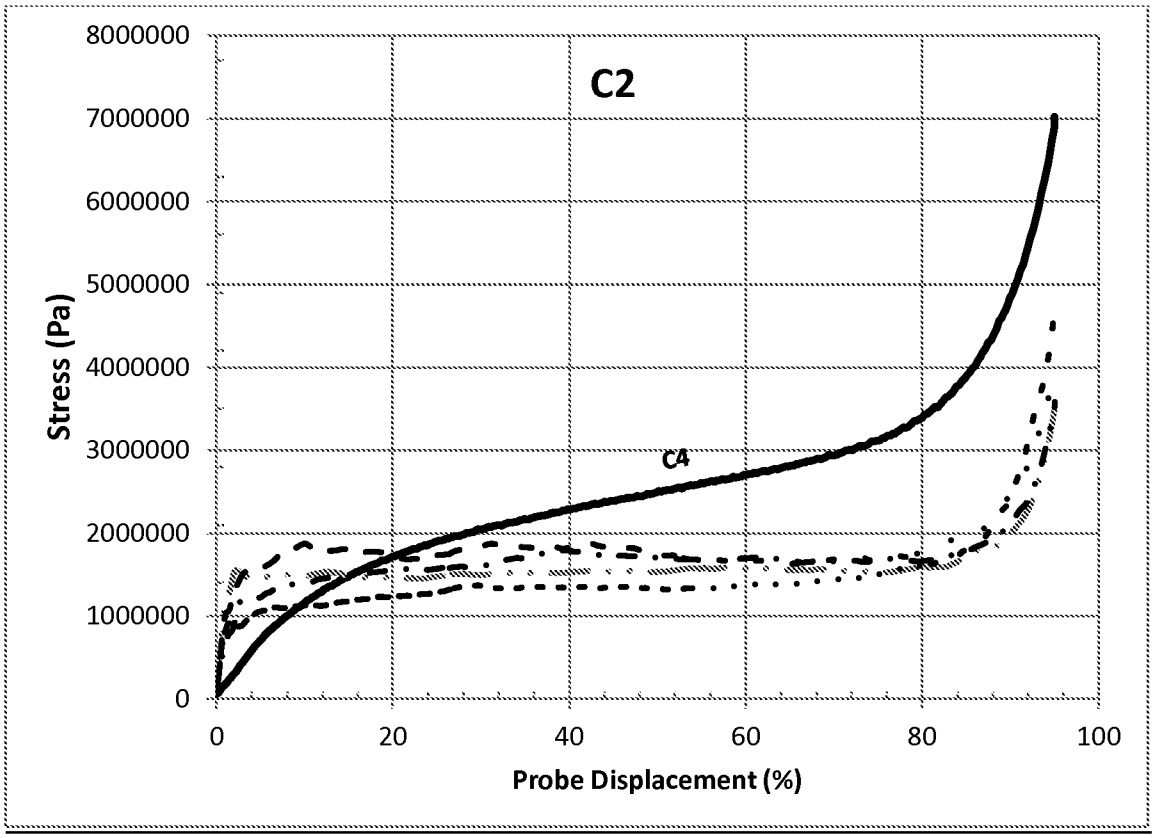
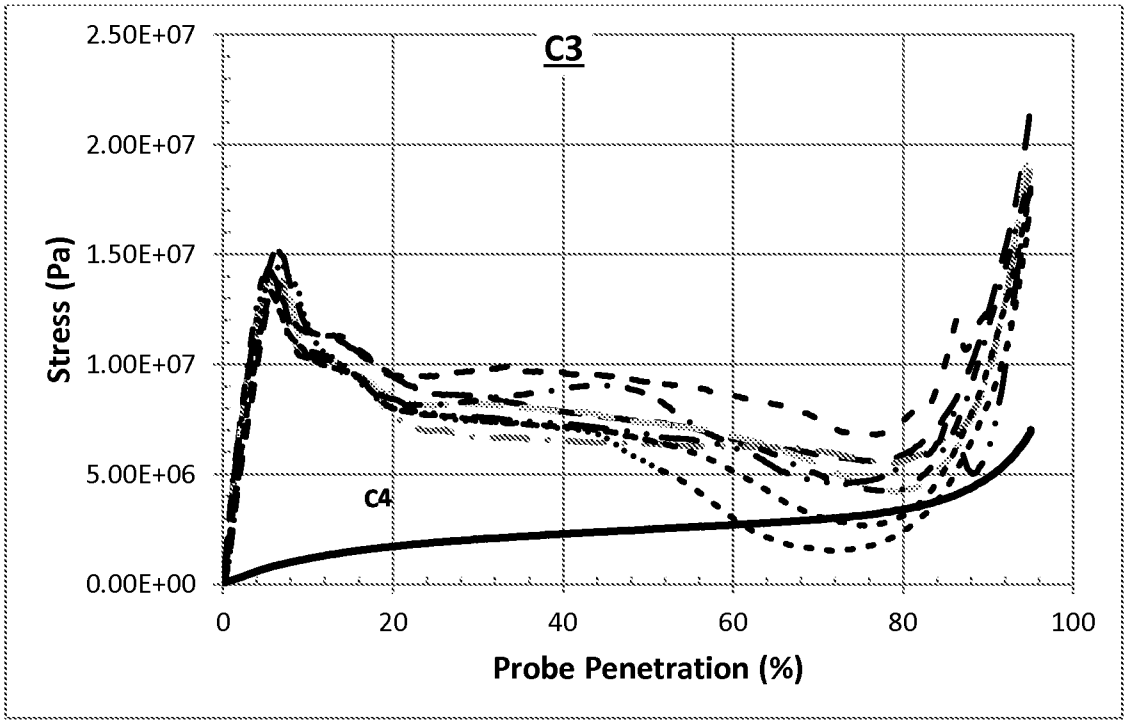

C2
C4
Stress (Pa)
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
0
20
40
60
80
100
Probe Displacement (%)

FIG. 4


C3
C4
2.50E+07
2.00E+07
1.50E+07
1.00E+07
5.00E+06
0.00E+00
Stress (Pa)
0
20
40
60
80
100
Probe Penetration (%)

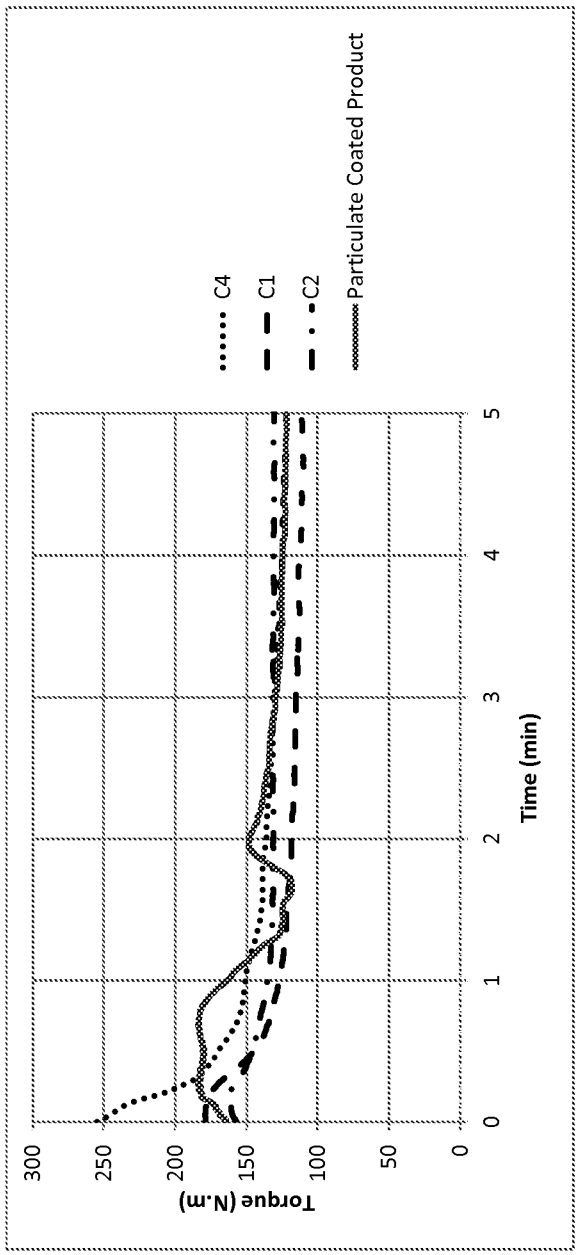

C4
C1
C2
Particulate Coated Product
Torque (N.m)
300
250
200
150
100
50
0
0
1
2
3
4
5
Time (min)

FIG. 5

FIG. 6

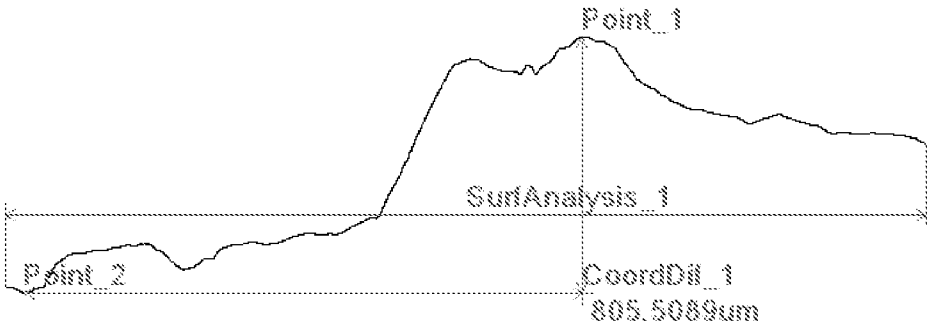


FIG. 7A

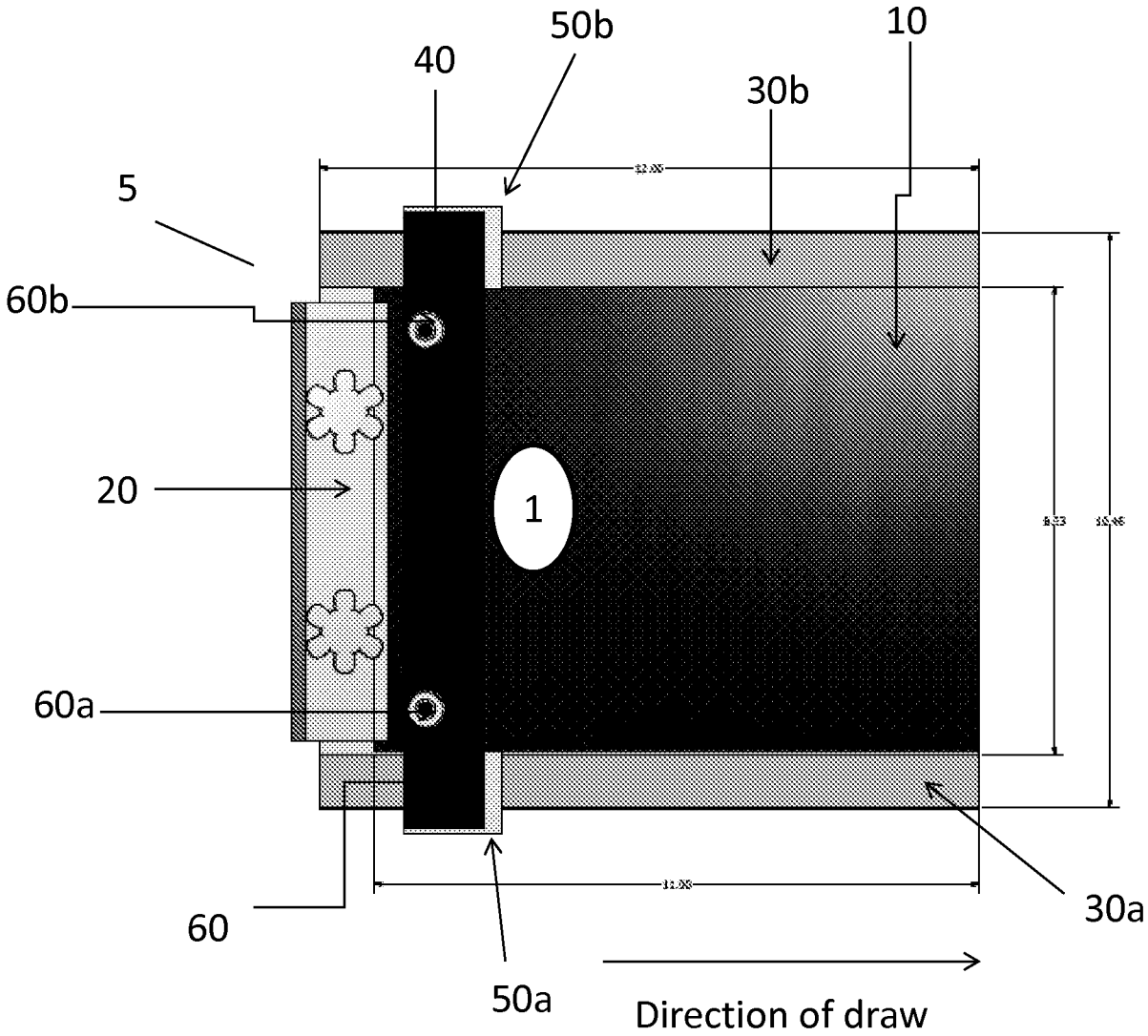


FIG. 7B

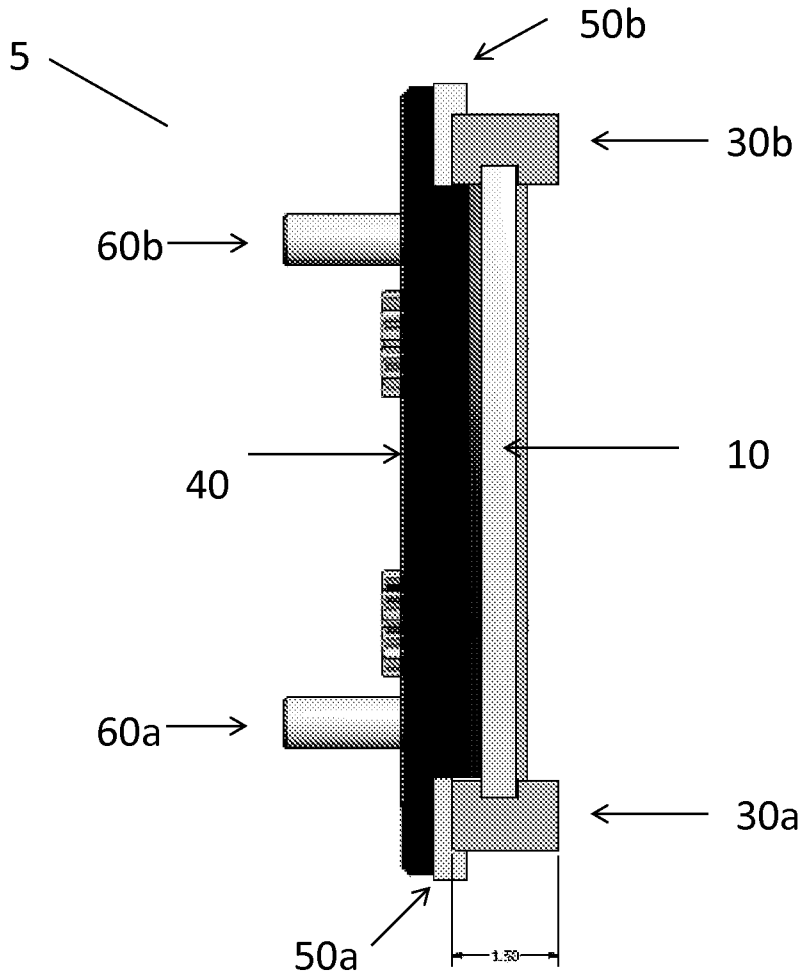


FIG. 7C

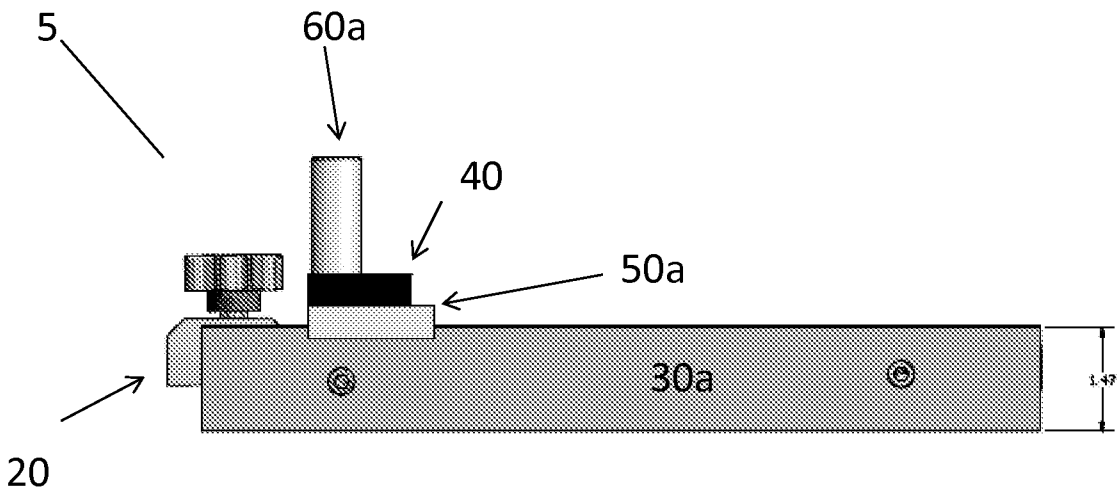


FIG. 8A

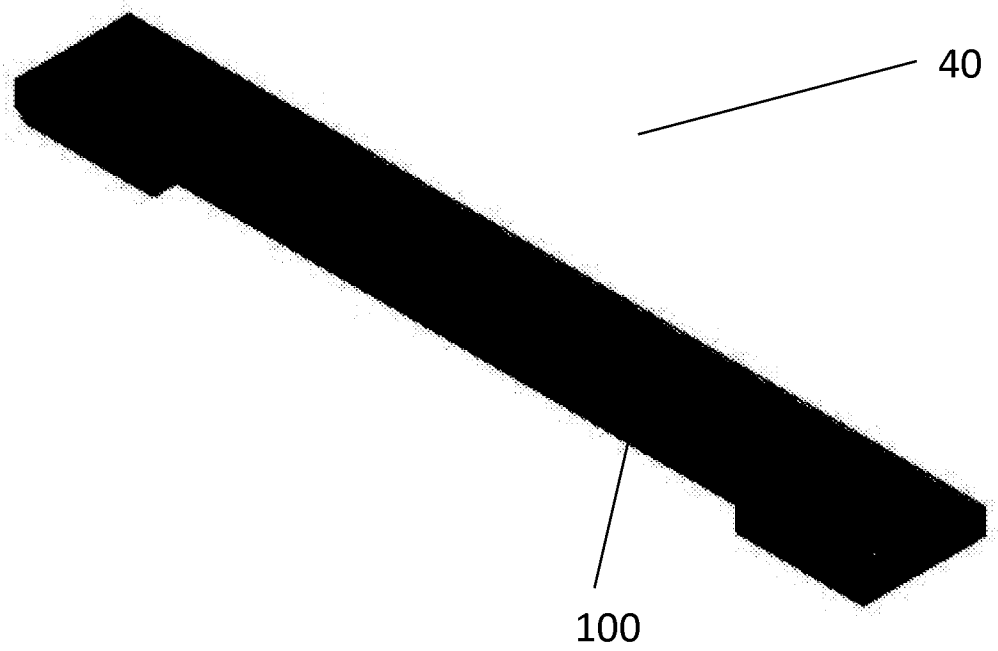
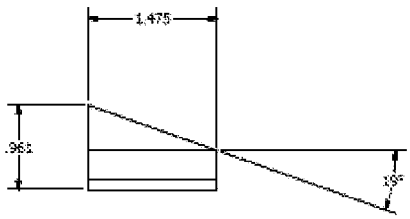


FIG. 8B



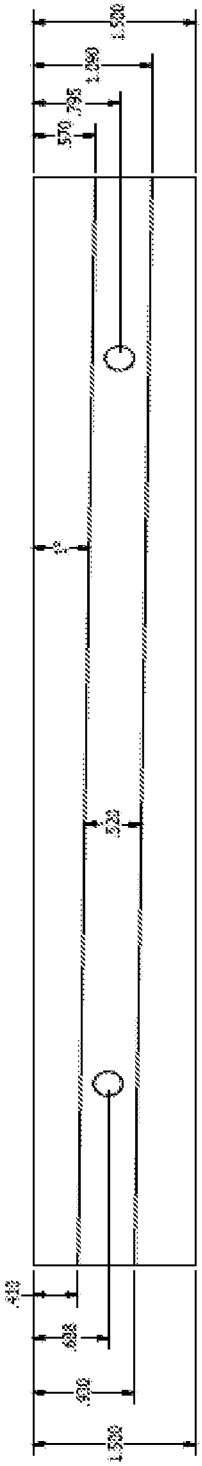


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/058720

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23G3/54 A23G4/20 A23G3/34
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data, BIOSIS, COMPENDEX, FSTA, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2009/142444 A1 (JARRARD JR MARK [US] ET AL) 4 June 2009 (2009-06-04) claims 42,46; figure 1; examples 1-3; tables 1,2,4	1-38 1-31

X	JP 2003 000157 A (FREUNT IND CO LTD) 7 January 2003 (2003-01-07) abstract paragraphs [0014], [0021], [0022]; example 1	1-38

X Y	US 2012/015071 A1 (ORTEGA OMAR [MX] ET AL) 19 January 2012 (2012-01-19) claim 1; examples 1-3 paragraphs [0006], [0009]	32-38 1-31

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 February 2015	17/02/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Granet, Nicolas

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/058720

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