ABSTRACT

Techniques for preparation of a glazed microwave popcorn product are disclosed. In one embodiment, a glazed microwave popcorn product includes a first package comprising unpopped popcorn for popping in a microwave oven, an oil/fat-based slurry, and a second addition package comprising a glazing blend for adding to the popcorn after popping are described. In another embodiment, a one-step process comprises a charge of microwavable popcorn with a particulate glazing blend included with a charge of unpopped popcorn and a charge of oil/fat-based slurry.
FORMING POPPED POPCORN

DISTRIBUTING A GLAZING BLEND ON THE POPPED POPCORN

FIG. 8
COMPOSITION(S) FOR PROVIDING GLAZE ON MICROWAVE POPCORN, PRODUCTS, AND METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Application Ser. No. 60/793,130, filed Apr. 19, 2006. Said U.S. Provisional Application Ser. No. 60/793,130 is herein incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention generally relates to the field of microwave popcorn, and more particularly to compositions and methods for providing microwave popcorn with a glaze.

BACKGROUND OF THE INVENTION

[0003] Microwaveable popcorn products have become very popular consumer items. Typically, the product is provided to the consumer in a form comprising unpopped popcorn enclosed within a disposable microwave package or container, such as a paper or fiberboard container. In many instances, microwave active materials, sometimes called microwave susceptors or receptors, are provided within the package arrangement to facilitate collection of the microwave energy and heat transfer to the popcorn product. The consumer product is typically used by placing the microwave package, with the unpopped popcorn therein, in a conventional microwave oven. After exposure to microwave energy in a conventional oven for about 1-5 minutes, typically at least about 95% of the popcorn converts to its popped form for consumption.

[0004] With typical microwave popcorn products, the unpopped popcorn kernels are enclosed in the microwave package in the presence of a slurry primarily comprising oil and/or fat (herein sometimes referenced as oil/fat or fat/oil) for facilitating the popping process. In part, the oil/fat operates as a heat sink for energy during the operation and facilitates retention of heat within the container for helping the popcorn pop to its fullest. The oil/fat also provides distribution of slurry over the popped kernel affecting color, mouth feel and taste.

[0005] The composition within the microwave popcorn package may include various added flavoring(s), color(s) and/or other food additives. However, consumers may desire a wider range of flavors and types of microwaveable popcorn products.

[0006] Consequently, there remains the need for a wider range of microwave popcorn product flavors and types.

SUMMARY OF THE INVENTION

[0007] Herein, processes and techniques for providing glazed microwave popcorn are disclosed. In general, compositions are defined for providing microwave popcorn with a glaze utilizing only the microwave process, and not a separate heat addition process, for providing the glaze. In one embodiment, a two-step process is provided in which the popcorn is first popped in the microwave oven, the glazing composition is sprinkled over the popcorn, and the popcorn and glazing composition together are exposed to still further microwave energy for converting the glazing composition into a desirable glaze. In another embodiment, a one-step process is provided in which the glazing composition is provided in the original microwave package along with the unpopped microwave popcorn. With the one-step process, the glaze is generated as the popcorn is popped.

[0008] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not necessarily restrictive of the invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention and together with the general description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

[0010] FIG. 1 is a schematic depiction of a microwave popcorn package, including an unpopped popcorn charge and slurry as described, wherein the microwave popcorn package is shown depicting the microwave popcorn package and a glazing packet stored in an over wrap;

[0011] FIG. 2 is a schematic top plan view of the microwave popcorn package in FIG. 1, wherein the over wrap has been removed and the microwave popcorn package unfolded as it generally would be for use in a microwave popcorn operation;

[0012] FIG. 3 schematically depicts the glazing packet in FIG. 1, removed from the over wrap and separated from the microwave popcorn package;

[0013] FIG. 4 is a schematic plan view of a package blank from which the package of FIG. 2 may be formed;

[0014] FIG. 4A is a schematic plan view of a package blank for forming a mini bag, usable with principles according to the present disclosure;

[0015] FIG. 5 is a cross-sectional view taken along line 5-5 in FIG. 2;

[0016] FIG. 6 is a schematic depiction of the step in the utilization of the arrangement depicted in FIG. 1, wherein the microwave popcorn has been popped in a microwave oven and poured into a bowl, and the contents of the glazing packet are being sprinkled over the popped popcorn;

[0017] FIG. 7 is a partial isometric view of a tub arrangement usable with a glazing composition according to the present disclosure, wherein a portion of the tub arrangement has been cut-away for showing the glazing packet; and

[0018] FIG. 8 is a flow diagram illustrating a method for making a two-step glazed popcorn product.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings.
Referring generally to FIGS. 1 through 7, a microwave popcorn product and a method for preparing a glazed microwave popcorn product are disclosed. In one embodiment, a one-step process for providing a glazed microwave popcorn product utilizes a charge of unpopped popcorn kernels and a slurry of oil/fat, glaze in particulate form, coloring, and/or flavoring. In another embodiment, a two-step process for providing a glazed popcorn product utilizes a charge of unpopped popcorn kernels in a slurry of oil/fat, flavoring, and/or coloring. The popcorn kernels are popped and a glaze is poured over the popped popcorn kernels.

1. ISSUES RELATING TO GLAZED MICROWAVE POPCORN

A. General Issues

As indicated above, the present invention relates to the preparation of microwaveable popcorn products. The invention particularly concerns provision of a glazing blend, mix or composition, by which a glazed microwave popcorn product is provided.

In general, a variety of factors are important in the development of a commercially desirable microwaveable popcorn product. For example, the popcorn composition for popping should be such that it will pop in most microwave ovens on a "high" or "high power" setting within a period of about 1.5 minutes in spite of the wide variations in microwave oven types and powers in the market. Additionally, the materials within the microwaveable popcorn package during popping should be sufficiently resistant to burning or scorching in order to avoid imparting an undesirable burnt taste to the product in a typical microwave popping operation, even if the consumer exceeds the minimum necessary popping time for the particular product and oven combination involved.

Herein, the package placed in the microwave oven for a popping process, with unpopped popcorn kernels enclosed, is typically referred to as a "microwave popcorn package," a "microwave package," or by variants thereof. The package may take a variety of forms, including flexible bags or tub arrangements.

Additionally, many consumers are already familiar with removing the microwave popcorn from the microwave oven and almost immediately touching the popcorn for consumption. With respect to this, it is noted that popped popcorn is typically picked up with the fingers during consumption. Thus, it is desirable, when removed from the microwave oven, the microwave popcorn not be unacceptably sticky or gooey and not be clumped in a large, not easily fragmented or separated, mass. Further, it is desirable that the popcorn not be unacceptably hot to the touch within only a short period after heating and not transfer unacceptable amounts of hot, sticky substances to the fingers after preparation, which may cause burns.

In general, a variety of flavor additions are desirable for microwave popcorn products. There are two typical approaches to providing such flavors.

In a "one-step" process, the glaze is placed in the microwave package along with the microwave popcorn. The glaze is distributed on the popcorn during the popping process. There is no requirement (at least by the product manufacturer) for subsequent glaze addition after the initial popping. A consumer may optionally choose to add additional flavoring according to the consumer's preference and own taste.

In a "two-step" approach, the popcorn is first popped. The glaze is added subsequent to popping. For example, a consumer may pop microwave popcorn and add additional salt, cheese, pepper, other flavoring, and/or glaze, typically after the popcorn is popped and placed in a bowl. Commercial microwave popcorn products may be package as two-step products by further providing a glaze packet or other material for addition to the popcorn after popping.

B. Issues Relating to Provision of Glaze on Microwave Popcorn

1. Glaze Application Generally

Glazes on popped popcorn resulting from a sugar-based glaze, often provided in a carefully heated kettle (bowl) or as a spray for already popped popcorn, for example, are well known. On a commercial basis, preparation of such popcorn is generally managed by the provider of the popcorn. In many applications, for example, (a) the popcorn is popped, (b) mixed, such as being sprayed or coated in a heated bowl or kettle with the sugar glazing for providing the glazed popcorn product, and (c) packaged for consumption.

With many of these products, the popcorn is first popped (air popped or popped in a kettle, for example) and placed in a kettle, or other construction, and stirred with, sprayed with, or otherwise mixed with a sugar-based glaze with radiant heating from a radiant heat source. This process provides the popcorn with a sweet, candy sugar, coat or other coating.

Herein, the term "radiant heat source" and variants thereof are meant to refer to heating not involving a microwave oven, but instead a heat source involving a heat transfer to the material at issue from an external heat supplier, such as an oven, heating mantle or coil, flame, etc. The terms "microwave heat source" and variants thereof, and "radiant heat source" and variants thereof, are meant herein to be mutually exclusive. Thus, a microwave popping process, in which a susceptor is present in the microwave package for becoming hot and transferring heat to the popcorn and/or slurry, is meant to be a microwave process and not a radiant heat source process.

For microwave popcorn products, it is desirable to provide the glaze in the absence of any heating step that does not involve a microwave heating process conducted in a microwave oven. That is, for a preferred commercial microwave popcorn product involving glazing and for producing a glazed popcorn for consumption, it is desirable to avoid any step that utilizes a separate radiant heat source (i.e., separate from heating in the microwave oven) for application of heat (above ambient) to the glazing. It is noted that a microwave heated glazing may be a more difficult type of process to satisfactorily control than a process involving radiant heated glaze applications, especially when performed by consumers with a variety of microwave ovens.

2. Characteristics of a Desired Glazed Microwave Popcorn

In general, a glazed microwave popcorn product is one in which the glaze on the popcorn provides:

a. A desirable, shiny, glossy appearance reminiscent of a candy-coated product, such as traditional candy coated popcorn (non-microwave);

b. Acceptable characteristics to the touch; and

c. Acceptable texture, crunch, taste and mouth feel when eaten.
With respect to appearance, popcorn flakes partially coated with a shiny glaze is generally not a desirable result. However, a distribution of a hard, candy-like glaze on the various popcorn flakes, without requiring complete coating, is typically enough for an acceptable, microwaveable, glazed popcorn product. In producing a glazed microwave popcorn product, the object is not necessarily to provide a consistently even glaze, but to provide a glaze that is reminiscent of glazed popcorn and has a sweet taste.

Desirable glazed microwaveable popcorn handling involves a variety of factors and characteristics. As the glazed popcorn is removed from the microwave oven, it preferably should not be sticky to the touch. A sticky popcorn coating may be uncomfortable to handle and transfer and may transfer undesirable levels of heat to the fingers. Additionally, the popcorn should not be fused together by the glazing into a single mass, defining one large, hard to handle, and solid clump that is not friable or easily separated into manageable pieces.

The glazing on the microwaveable popcorn should provide for a mouth feel (crunch, texture, etc.) reminiscent of glazed popcorn made with a glaze applied by radiant heat. However, unlike pre-popped popcorn coated with a syrup/sugar glaze (applied with a radiant heat process), glazing on a microwave popcorn product (if without added sweetener) typically will not be sufficiently sweet for providing a sweet candy taste. Rather, sweetness is typically imparted to the product through addition of a sweetener, which may be included within the popcorn composition prior to glaze or may be added as part of the glaze. Typically, the sweetener will be included in the popcorn and/or slurry during popping and prior to the glazing process.

In more general terms, candy coating processes often involve a syrup formed by heating a mixture of corn syrup and sugar and driving excess moisture out of the mixture. The syrup may be sprayed onto (or otherwise mixed with) pre-popped popcorn for providing coated popcorn. Such coatings are generally very sweet, and a relatively large amount of coating (about 5 parts by weight) is used. This type of process is unacceptable in a microwave process because such syrups cannot readily be distributed within the popcorn during the microwave popcorn process. Further, such syrups need to be carefully heated in order to avoid burning.

In general, providing a glaze in a microwave process involves managing the following issues:

1. Avoiding of undesirable levels of burnt taste generated by burning or scorching within the microwave process,
2. Ensuring that the glaze is well distributed on the popcorn,
3. Providing a glaze that does not undesirably retain heat as the popcorn is being removed from the microwave process for consumption,
4. Providing a glaze that does not result in an undesirably sticky or tacky sensation when touched,
5. Providing a glaze that does not result in undesirable levels of clumping within the popcorn, causing the popcorn kernels to meld together as a large mass as opposed to an easily manageable and separated collection of glazed popcorn flakes (whether some clumping is present or not), and
6. Providing a glazed microwave popcorn product that has an acceptable sweet taste, glaze appearance, mouth feel and crunch.

II. PROVISION OF A GLAZE IN A TWO-STEP MICROWAVE POPCORN PROCESS

A. The General Steps of the Process

Generally in a two-step microwave process, the glaze is provided by addition subsequent to the microwave popping step, often in a separate microwave step. In one embodiment, the microwaveable popcorn product is positioned in the microwave oven in a first step, and the popcorn is popped upon exposure to a setting of "high" for a period of about 1-5 minutes, typically 1.5-4 minutes depending upon the amount of popcorn in the bag and the power of the microwave oven. Often, the consumer pops the popcorn on a "light" microwave oven setting until the sound of popping kernels either ceases or slows to a very low rate.

The popcorn package containing the popped popcorn may be removed from the oven and opened. If a bag arrangement is used, the popcorn may be poured into a bowl for the second step. If a tub arrangement is used, any balloon or covering remnant may be removed from the tub, and the tub containing the popped popcorn may be used in the second step.

In the second step, a glazing blend or glazing composition that has not been pre-heated (by a radiant heat source or a microwave source) is distributed over the popcorn. The popcorn with the added glazing blend may be reintroduced in the microwave oven for additional heating for converting the added glazing composition into a glaze coating on the popcorn. For a commercial item, it may be desirable for the glazing composition to be such that the glaze composition will form in typical microwave ovens on a high setting within an exposure period of about 10-45 seconds, typically 20-35 seconds. A microwave popcorn process for generation of glazed popcorn may involve application of a glazing material by merely distributing a room or ambient temperature particulate over the popcorn and subsequently microwave heating (in the absence of a radiant heat step).

For a commercial microwave popcorn product, it may be desirable that the glazing composition or blend be distributed adequately throughout the popcorn without stirring or mixing steps, whether such stirring or mixing steps are before the popcorn reintroduction to the microwave oven and heating of the glaze, or during an intermittent break in the second microwave exposure or step. Preferably, the glazing composition or blend may be applied merely with steps of sprinkling, pouring, and/or a minor amount of shaking the tub or bowl of popcorn and without the need for any intermittent break during the second microwave exposure or step. Preferably, the glazing step is accomplished without need for stirring the glazing material into, or onto, the popcorn pieces and without stirring the popcorn pieces themselves.
B. Preferred Materials for the Glazing Blend

[0051] In order to facilitate glaze formation, it may be desirable for the glazing blend or composition to be provided in a dry, non-tacky, and/or solid particulate form. This type of glazing blend or composition may be easily distributable compared to other types of glaze. The glaze composition may be provided in a particulate form with at least 80%, often at least 90% by weight particles within the range of 50-300 microns, inclusive. In many instances, the particles are at least 95% by weight and usually at least 98% by weight between 50 and 300 microns. Solid particulate compositions may be characterized as either “powder” or “granular” depending on the particulate size range or distribution range involved.

[0052] The composition sprinkled over the popped popcorn for the second microwave step may be referred to as the “second step addition material” as well as other similar terms. The second step addition material may comprise 100% glazing blend or composition. However, it may comprise additional food materials as needed. The material sprinkled over the popped popcorn for the second microwave step may only comprise components of the glazing blend. Alternatively, the second step addition material may include additional components for distribution on the popped popcorn.

[0053] It is typically desirable that the particulate glazing composition comprise a material with a glass transition temperature (Tg) of no greater than about 83° C., no less than about 68° C., and typically about 70° C. to 78° C. A material having a glass transition temperature in the range between about 70° C. and 78° C. will convert to form the glaze, within a relatively short period of time when exposed to a high setting in a typical microwave. Further, it will provide a glaze without becoming excessively hot or sticky and uncomfortable for the consumer to handle after the second microwave step of the two-step process.

[0054] Further, it is desirable that low amounts of the glaze composition by weight to popped popcorn be added. This ensures the glaze is not unacceptably thick when formed, and the glazed popcorn is not fused into a large, hard to manage mass in spite of not being stirred during glazing. This desirable characteristic is facilitated by having the glaze provided primarily in a small particulate form so that it may easily be distributed evenly on the popcorn in a bowl or other containers.

[0055] Typically, both the contents of the microwave popcorn package and the contents of the glaze, or other material separately added, are formulated to be shelf stable under ordinary conditions of shipping and storage on store shelves without special storage conditions, such as refrigerated storage.

[0056] Microwave popcorn compositions may be formulated based upon the amount of unpopped popcorn kernels, as opposed to the weight of popped popcorn. The amount of glaze composition added to the popped popcorn in a microwave glazing process may be defined with respect to the amount of glazing composition added to popped popcorn resulting from a defined amount of unpopped popcorn. Herein, the amount of glazing composition added in a two-step microwave process would generally be referred to as being in at least a “glazing effective amount.” The term “glazing effective amount” is meant to reference the least amount of glaze addition which provides a desirable appearance and mouth feel. Typically the weight ratio of glazing composition to unpopped kernels will be at least 0.06, not more than 0.45, and typically 0.08 to 0.4, inclusive when techniques described herein are practiced. Alternatively stated, the glazing composition is typically provided in an amount, based upon weight of unpopped popcorn kernels, within the range of about 6%-45%, typically about 8%-40%.

[0057] Not all edible candy glazes may be suitable for utilization as a glazing composition on microwaveable popcorn. For example, a candy glaze merely comprising sucrose (with or without minor amounts of added color, flavor and/or emulsifier) may not convert from a granular state to a desirable glaze under the conditions desired for a two-step microwave process. Additionally, a candy glaze merely comprising corn syrup solids may not convert from a granular state to the desirable glaze under the conditions desired for a two-step microwave process. Further, a candy glaze merely comprising maltodextrins may not convert from a granular state to the desirable glaze under conditions desired for a two-step microwave process. Even further, a glaze merely comprising starch may not convert from a granular state to the desirable glaze under conditions desired for the two-step microwave process. When mixtures of corn syrup solids and sucrose are used, the corn syrup tends to operate as an interfering agent. The corn syrup solids tend to restrict the sucrose molecules in the mixture from crystallizing.

[0058] Typically, the glazing composition will comprise an intimate mix of sugar(s) and hydrolyzed starch(es). The glazing blend typically includes an aqueous dispersion (solution or suspension) that is spray dried into a particulate material. As part of the manufacturing process, the glazing composition may include a food starch, a modified food starch, and/or an emulsifier. The emulsifier, such as lecithin, may help with distributing the components in the aqueous dispersion during the spray dry process and during distribution over the popcorn. In some instances, flavor and/or color component(s) may be provided in the aqueous dispersion to be spray dried. In other instances, particulate material from the spray dried process may be treated with flavor and/or color component(s) after the spray dry process.

[0059] A variety of flavors may be provided in the glazing composition for providing a variety of microwave popcorn products. Examples include cotton candy, cinnamon, caramel, apple, caramel apple, butter pecan, coffee, toffee and green apple. Other flavors may be added to the glazing composition without departing from the scope and spirit of the present invention.

[0060] Various color agents may be included in the glaze composition for providing colored glazed microwave popcorn products. The color may be selected for relation to the flavor. For example, a cotton candy flavor may be provided with a pink color, a cinnamon flavor may be provided with a dark red color, etc. Alternatively, the color may be chosen for seasonal or holiday themes. For example, green may be utilized for St. Patrick’s Day or orange may be utilized for Halloween.

[0061] Typically, the glaze material, including a mixture of sugar(s), hydrolyzed starch(es), and possibly modified starch, will not impart a substantially sweet flavor to the
overall glazed popcorn unless an artificial sweetener, such as sucralose, is provided. This is typically due to two factors. First, the glaze composition (if without artificial sweetener) does not typically include enough sugar (for example sucralose) for providing a noticeably sweet taste to the popcorn. Second, the glaze composition (if without artificial sweetener) is not typically applied in a large amount on the popcorn for providing the popcorn with a sweet sugar flavor.

[0062] An additional sweetener is typically included on the popcorn for giving the popcorn a sweet taste. For example, the sweetener may be included in either the first step of popping in the two-step process, in the glazing blend, or both. Typically the sweetener is provided in the first step. One useable sweetener is sucralose, which may provide a high flavor impact with a relatively small amount used. Additionally, sucralose has been found to be relatively stable, compared to sucrose, under microwave conditions, even in the presence of salt. An example of sucralose used as a sweetener may be found in U.S. Patent Application Nos. 2002/0127306 and 2003/0012853, both incorporated herein by reference. Herein, the sweetener will typically be characterized as being used at least a “sweetening effect of amount.” The term “sweetening effect of amount” is meant to be an amount sufficient for providing a noticeable sweet flavor to the resulting microwave popcorn product.

[0063] Often it is desirable to provide salt (sodium chloride) as a flavorant in the final popcorn product. The salt may be provided either in the microwave popcorn bag during the first step, in the second step during sprinkling, or both. However, it has been found that salt may contribute to scorching of the glazing blend. Often, a scorched or burnt taste is a result of interaction between the salt and sugar.

[0064] The following steps are recommended for lessening the negative effect of salt with respect to avoiding or minimizing a burnt or scorched taste in the resulting glaze product:

[0065] 1. If the formulation of the product desired includes salt provided in the microwave popcorn bag, it should be present in an amount (by wt.) no greater than 1% by wt. on the basis of unpopped popcorn kernels, often no more than 0.75% based on weight of unpopped popcorn kernels and preferably no more than 0.25% of the weight of the unpopped popcorn kernels.

[0066] 2. If the salt is mixed with the glazing composition (in the second step addition material), the salt would typically be present in an amount of no more than 2% by weight of the glazing blend composition, typically no more than 1.5% by weight of the glazing blend composition, and typically no more than 1% by weight of the glazing blend composition. The salt level may be stated with respect to the amount of unpopped popcorn kernels within the microwave popping bag. Typically the salt within the glazing composition (the second step addition material) would be an amount no more than about 1.5%, typically no more than 1% and preferably no more than 0.5%, by weight, based on the weight of the unpopped popcorn kernels within the microwave pack.

[0067] 3. The salt may be provided in the aqueous dispersion with the glazing blend composition, prior to spray drying. In this embodiment, typically the salt is present no more than about 2%, by weight, of the glazing blend composition (as dried), often no more than 1.5% by weight, and usually no more than 1% by weight. The salt amount may be stated in terms of an amount by weight of the unpopped popcorn kernels within the microwave popcorn bag. When salt is included in the aqueous dispersion for forming a spray dried glazing blend composition, it is typically present at a level no more than 1.5%, typically no more than 1%, and preferably no more than 0.5%, by weight, based on the weight of the unpopped popcorn kernels in the microwave popcorn bag.

[0068] 4. Generally, it may be desirable to minimize the amount of salt to the minimum amount effective for providing the flavor enhancement desired since greater amounts of salt, in either the popcorn bag or the second addition material (formulated with or merely added to the glazing blend composition), are likely to increase the probability of burnt taste. Typically the total amount of added salt in the system (popcorn bag plus second step addition) will be no more than 2%, by weight, compared to the weight of the unpopped popcorn kernels.

[0069] Glazed microwave popcorn differs from glazed popcorn made in a radiant heat “candy coat” type process. In particular, a careful application of the sucrose based glazing composition is involved in a radiant heat candy coat process. Sweetness in the popcorn generally results from the glaze itself, typically comprising a mixture of sucrose and salt applied in a ratio of about 5 to 1, per weight of popped popcorn. In the microwave process, the glaze itself, although it includes some sugar, does not typically impart a substantially sweet taste to the popcorn and is used in lower amounts. When a sweet taste is desired, typically an additional artificial sweetener stable under microwave conditions, such as sucralose, is utilized.

[0070] Additional differences exist between glazed popcorn obtained by radiant heating and microwave heating. When a glaze is applied in a bowl or kettle process using radiant heat, the popcorn is either sprayed with or stirred with the pre-heated glaze. An awkward slow spray or stirring process requiring careful control is inconvenient for a home microwave heating system. Additionally, in a microwave process there are particular issues related to sugar/salt combinations not found in processes involving radiant heat applications. Further, with a commercial microwave popcorn product, it is desirable that the provision of a glaze not involve a substantial time commitment or awkward cooking step after the popcorn is popped. The second step of the two-step glazing process previously described may be conducted in fewer than two minutes (with the microwave oven exposure being only for 10-45 seconds).

[0071] One commercially available particulate food material suitable for use as a primary component (or exclusive component) in a solid, particulate glazing blend for microwave popcorn processes may be a product named “Ultra Seal.” “Ultra Seal” is a material originally formulated by the supplier as a flavor base, as opposed to use as a candy glaze in a microwave process. It is commercially available from Givaudan, Cincinnati, Ohio, 45216. It may be obtained from Givaudan formulated with a variety of different flavors. Flavors utilized may include cinnamon, cotton candy, caramel, apple, caramel apple, butter pecan, coffee, toffee, and green apple. It may often be used without modification for some microwave popcorn glazing blends.
In addition to the glazing blend, the second step addition composition may include additional additives. For example, additional additives may include colored starch pieces used together with the glazing blend, but formulated separately for providing a multi-colored effect in the popcorn. Examples of colored starch pieces may be commercially available from a variety of vendors, including Q.A. Products, Inc., Elk Grove Village, Ill., 60007. Such starch pieces are often provided in a range of particulate sizes. Typically, the cross-sectional starch particulate sizes are in the range of 0.5–0.75 sq. inches, although alternatives are possible. They may be provided in a multi-color collection, although individual colors may be selected. These colored starch pieces may be used for imparting a more decorative appearance to the overall glazed popcorn. The starch pieces typically retain their integrity during the second step addition process. However, the colors may distribute through the popcorn kernels and provide mixed colors. Further, they may become attached to a portion of the kernels as a result of the glaze formation. Salt may be included in the second step.

C. General Formulations.

1. Mass Ingredients Provided in the Popcorn Bag for the First Step Popping

Microwave popcorn products may be provided in a variety of sizes depending on the amount of popcorn desired in a single popping operation. Two popular consumer sizes include a generally individual or small, sometimes referred to as “mini,” popcorn product, typically containing 25–35 grams of unpopped popcorn per package, and a full or regular size product, which typically contains about 60–80 grams of unpopped popcorn per microwave package.

A popcorn slurry may be included in a microwaveable popcorn product. The term “popcorn slurry” refers to all other food components with the popcorn microwave package, except the unpopped popcorn kernels. The popcorn slurry may be about 2%-60%, by weight, based on the unpopped popcorn kernels. Typically, the slurry is about 10%-40%, by weight of the unpopped popcorn kernels. A mini bag or product typically contains about 25-50 grams of unpopped popcorn and about 1-20 grams of slurry. A full or regular size bag may typically contain about 50-70 grams of unpopped popcorn and about 15-40 grams of slurry.

2. Typical Popping Slurry Compositions

A variety of popping slurry compositions may be utilized with a two-step glazing process. The popping slurry composition may include an oil/fat component. The term “oil/fat component,” or variants thereof, is meant to refer to oil, fat, or other mixtures included in the popping slurry.

Partially hydrogenated soybean oil (PHSO) is a widely utilized oil in microwave popping, and may be utilized in popcorn slurries. Typically, partially hydrogenated soybean oils contain a substantial amount of trans-fatty acids. Palm oil may be utilized if a low trans-oil/fat material is desired. Although palm oil may be acceptable in many instances, it may be undesirable in others due to its saturated fat content. Additionally, other low trans-fatty acid compositions suitable for use in microwave popcorn compositions may be used. Examples may be found in WO 2006/004806, published Jan. 12, 2006, incorporated herein by reference.

The oil/fat component may be selected from material relatively solid under typical storage conditions, but may become liquid under the conditions of a microwave popping operation and facilitate heat retention and distribution over popped flakes during the microwave popping process. Typically, the oil/fat or oil/fat blend will be selected to have a Mettler drop point (or melting point) no greater than 140°F (60°C) and at least 90°F (32°C), most often within the range of about 100°F to 135°F (37.8-57.2°C). The oil/fat component may comprise at least 50%, by weight, of the (non-popcorn) slurry and usually 80%-100%, by weight, of the slurry. The oil/fat component may be provided in an amount, by weight of unpopped popcorn kernels, within the range of 10% to 40%. Other amounts of the oil/fat composition may be utilized without departing from the scope and spirit of the invention.

In many popping slurry applications some salt may be desirable for facilitating flavor enhancement. If it is perceived that the salt within the popping bag is likely to provide a burning or scorching problem, it may be preferable to either use no or minimal amounts of salt.

The popping slurry may include additional flavors and/or colors as may be desired for enhancing the flavor and visual impact of the popcorn product. Flavor and color ingredients may be provided separately or as part of the same additive. The flavor and color ingredients may comprise at least 0.05% and usually not more than 3% of the slurry, by weight. Suitable color or flavor ingredients may include beta carotene, various FD & C dyes, various FD & C lakes, annatto, turmeric, and paprika. Other flavor and color ingredients may be used as needed.

A glazed commercial microwave popcorn product may have a sweet taste. Typical candy glaze popcorn products, made with a radiant heat glaze addition, are quite sweet. Many consumers expect a sweet taste when the popcorn includes a hard, glossy coating. As previously indicated, the glazing blend provided in the second step does not necessarily impart a substantial, sweet taste to the popcorn. As a result, it may typically be desirable to provide an additional artificial sweetener. The additional artificial sweetener may be provided in the microwave popcorn bag, along with the slurry and unpopped popcorn kernels, in the glazing blend, or both. Typically, the sweetener is provided in the bag with the unpopped popcorn kernels and slurry. This may provide for desirable sweet taste to the resulting popcorn. A suitable microwave stable sweetener, which may be used in the presence of salt, is sucralose. Sucralose may be obtained from Tate and Lyle, Decatur, Ill., 62626, under the trade name “Splenda.” Utilization of sucralose in microwave popcorn operations, even in the presence of salt, may be found in U.S. Patent Application Nos. 2002/10127306 and 2003/10012853, incorporated herein by reference. A sweetener will generally be used in at least a “sweetening effective amount,” or an amount sufficient for providing a sweet taste to the consumer. Typically, sucralose will be present in the slurry composition in an amount, by weight, based on total slurry composition (without popcorn), in the range of about 0.004%-0.30%, typically about 0.1%-0.15%. The amount of sucralose utilized, based upon the weight of the unpopped popcorn kernels, for imparting a sweet taste, may typically be in the range of 0.0001 to 0.015%, by weight.
In Table 1, slurry compositions suitable for utilizing in glazed microwaveable popcorn products are shown.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>SLURRY COMPOSITIONS USABLE IN A TWO-STEP MICROWAVE PROCESS FOR GLAZED POPCORN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shurry Ingredients</td>
<td>% by wt. Slurry</td>
</tr>
<tr>
<td>Oil/fat</td>
<td>85%-97%</td>
</tr>
<tr>
<td>Sucrose</td>
<td>0.004%-0.3%</td>
</tr>
<tr>
<td>Flavor</td>
<td>0.1%-2.0%</td>
</tr>
<tr>
<td>Color</td>
<td>0.1%-2.0%</td>
</tr>
<tr>
<td>Salt (NaCl)</td>
<td>0%-2%</td>
</tr>
</tbody>
</table>

1A typical oil/fat would be palm oil.

3. Second Step Addition Component Including Glazing Composition

A second step addition component or material may include the glazing blend or composition. Additionally, the second step addition component may include additional components, for example, starch pieces.

The amount of glazing composition or blend may be chosen for providing an even distribution over the popped popcorn flakes and a desired conversion from particulate form to a consumer acceptable glaze form within a second microwave step of about 10-45 seconds, usually 20-35 seconds. Generally, the glazing blend is used at least a glazing effective amount. The amount of glazing blend may be within the range of about 10%-40%, often 10%-30% of the total weight of unpopped popcorn kernels in the microwave popcorn container. In a "mini" bag comprising about 25-35 grams of kernels, the glazing composition may be about 3-7 grams. In a full-size bag comprising about 60-80 grams of unpopped popcorn kernels, about 10-30 grams of glazing blend may be used.

A glazing blend may typically comprise a particulate sugar/hydrated starch composition. In one embodiment, the glazing blend includes Ultra Seal flavor base product formulated with an appropriate flavor, such as cotton candy, cinnamon, caramel, apple, cinnamol apple, butter pecan, coffee, toffee, and green apple.

In addition to a glazing composition, the second step addition component may include further additives, such as starch pieces, for providing a desirable color. The starch pieces may be provided in an amount of about 3%-10% based on weight of unpopped popcorn kernels. The starch pieces may be utilized within the second step addition component in an amount within a range of about 10%-50%, based on the glazing blend.

Additionally, salt may be provided in the second step addition material. The salt may be mixed into the material or may be formulated with a glazing blend during the spray dry process. In either case, minimizing the amount of salt present may be advantageous for avoiding a scorched or burned taste.

III. AN EXAMPLE COMMERCIAL PRODUCT AND ITS USE

A variety of types of microwave popcorn packages have been developed. Both flexible bag arrangements and tub arrangements may be utilized in the present invention, as well as other arrangements. With respect to FIGS. 1-5, a flexible bag arrangement is shown. In FIG. 6, the step of applying the second step additive is shown. In FIG. 7, a tub arrangement is shown.

Flexible and expandable microwave popcorn arrangements utilizing bags generally involve a collapsed paper or treated paper package having a microwave interactive sheet receptor, or susceptor, operably positioned therein, and with a microwave popcorn composition positioned in covering relation or in thermocoductive relation to a microwave interactive construction. For many conventional microwave popcorn bag arrangements, the package may be folded into a tri-fold configuration during storage and prior to use. The tri-fold package may be positioned in a moisture barrier storage over-wrap for enhancing the shelf life of the contents.

Reference numeral 1, FIG. 1, depicts an example flexible microwaveable popcorn bag or package usable with the current invention. In FIG. 1, popcorn package 1 is depicted in a conventional tri-fold configuration 2 for storage. In FIG. 1, the tri-fold configuration 2 is sealed within a storage over-wrap 3. A usable storage over-wrap 3 may comprise 90-140 gauge, biaxially oriented polypropylene material, although other materials may be used. The over-wrap may be discarded when the popcorn package is removed for use.

Still referring to FIG. 1, the over-wrap 3 may further include a second step addition packet 4. The second step addition packet 4 may comprise a pouch including the second step addition material. The second step addition packet 4 may be positioned within the over-wrap 3 separately from the microwaveable popcorn package 1. When the over-wrap 3 is opened, the second step addition packet 4 remains sealed and may be physically separated from the microwaveable popcorn package 1. After removal from the over-wrap 3, the microwaveable popcorn package 1 may be positioned, as described below, in a microwave oven for popping the popcorn. The second step addition packet 4 would not be included in the first microwave popping step, but utilized subsequent to the popping step. After opening, the over-wrap 3 is typically discarded.

In FIG. 1, the combination of the microwaveable popcorn package 1, the over-wrap 3, and second step addition packet 4 are referenced together as a commercial microwaveable popcorn product 1A.

Still referring to FIG. 1, the microwave popcorn package 1 has two opposite sides 5, 6. Each opposite side 5, 6 comprises two side gusset outside edges, along which creases are located.

As indicated, the microwaveable popcorn package 1 range depicted in FIG. 1 is shown as a tri-fold arrangement. It will be apparent, however, that techniques according to the present disclosure may be utilized in other package arrangements.

In FIG. 2, a top plan view of microwaveable popcorn package 1 is schematically shown in an unfolded orientation, similar to positioning in a microwave oven for a step of popping an internally received popcorn charge, but before expansion. For application of the techniques described herein, the initial step of popping the microwave popcorn may be referred to as the "first step" or "microwave
During a popping operation, moisture inside the popcorn kernels absorbs microwave energy generating sufficient steam and heat for kernel popping and expansion of microwaveable popcorn package 1. In addition, microwave interactive material absorbs microwave energy and dissipates heat to the popcorn charge. In preferred constructions, the microwave interactive material internally occupies at least central region 13 for greater thermocative contact with at least a portion of that region. Most of the microwave interactive material (by area or weight) is positioned in thermocative contact with a region of the bag interior in which the microwave interactive material will be covered by the popping charge when the microwaveable popcorn package 1 is positioned in the microwave oven for use. This is preferred because it leads to efficient utilization of the microwave interactive material and efficient heat transfer or heat retention in connection with a popcorn popping process. This technique is used in many conventional arrangements.

Attention is now directed to FIG. 3 in which second step addition packet 4 is depicted separate from the microwave popcorn product 1A. The packet 4 may comprise a moisture barrier package, for example, a paper/metalized polyethylene lamination having an interior with the second step addition component, including at least the glazing blend. The packet 4 may include a seal 4a for closing the packet. It may be provided with an easy tear opening feature, such as notch.

Attention is now directed to FIG. 5, a cross-sectional view taken generally along line 5-5, FIG. 2. From a review of FIG. 5 it will be understood the popcorn package generally comprises the construction defined first and second opposite face panels 20, 21, joined by first and second opposite, inwardly directed, side gussets 22, 23. Inwardly directed refers to gussets 22, 23 in the cross-section of FIG. 5, pointing or extending toward each other.

Gussets 22, 23 generally separate microwaveable popcorn package 1 into first and second expandable tubes 28 and 29. The popcorn charge 30 is substantially positioned and retained within one of the tubes. The other tube, prior to popping, is generally collapsed. Tube 28 may be sealed closed by temporary heat seals prior to the popping operation. The popcorn charge 30, inside of the microwaveable popcorn package 1, typically includes unpopped popcorn kernels and a popping slurry.

Still referring to FIG. 5, the side gusset 22 generally comprises outwardly directed edge creases or folds 33 and 34, fold 34 being adjacent face panel 21 and fold 33 being adjacent face panel 20, and inwardly directed, central fold 35. Similarly, gusset 23 comprises outwardly directed edge creases or folds 38 and 39, and inwardly directed, central fold 40, fold 39 being adjacent to face panel 21 and fold 38 being adjacent to face panel 20. Microwaveable popcorn package 1, for the arrangement shown in FIG. 4, is folded from a two-ply sheet of material, and panel 20 includes central longitudinal seam 42. Such folds as folds 33, 34, 35, 38, 39, and 40 are known for flexible microwave packaging. Examples may be found in U.S. Pat. Nos. 5,044,777; 5,195,829; and 5,650,084, all incorporated herein by reference. Further, such folds are described in PCT WO 2006/004906, published Jan. 12, 2006, and in PCT WO 2005/080225, published Sep. 1, 2005, both incorporated herein by reference.

Underneath popcorn charge 30, microwaveable popcorn package 1 includes microwave interactive construction or suspecter 45. The microwave interactive construction or suspecter 45 may be of conventional design. For example, the suspecter 45 may comprise a metallized polyester film.

In certain arrangements, such as the one shown in FIG. 5, the suspecter 45 may be positioned between layers of ply 46, 47 from which the microwaveable popcorn package 1 is folded. Even with the suspecter 45 positioned between flexible sheets 46, 47, microwaveable popcorn package 1 is referenced as 2-ply. In the arrangement shown in FIG. 5, the suspecter 45 only occupies a portion of the area between the plies 46, 47. Typically, the plies 46, 47 comprise a paper material, sometimes treated. Descriptions of example materials are provided in PCT WO 2005/080225, published Sep. 1, 2005, incorporated herein by reference.

Still referring to FIG. 5, in region 21a an inside surface panel 21 is shown. Region 21a defines an unpopped popcorn charge retention surface. This is because the unpopped popcorn charge 30 is generally positioned in contact with surface 21a, typically sitting on surface 21a, where the microwaveable popcorn package 1 is positioned in a microwave oven for popping. Referring to FIG. 5, the gusset 23 includes a panel section 49 adjacent to, and integral with, face panel 21, and gusset 22 includes a panel section 48 adjacent to, and integral with, face panel 21.

Attention is now directed to FIG. 4. FIG. 4 is a top plan view of a bag blank, panel or sheet 60 from which an arrangement according to FIGS. 1, 2, and 5 may be folded. Usable features for the blank 60, including example features sometimes illustrated in FIG. 4, are generally disclosed and described in PCT Applications WO 2005/080225 and WO 2006/004906, each of which is incorporated herein by reference. As is discussed in those references, a variety of sealing arrangements may be used to provide for desirable features in the microwaveable popcorn package 1. Various combinations of these may be implemented, as well as other variations as desired. The sealant fields indicated in FIG. 4 are meant to provide an example of a usable arrangement, with many alternatives being possible.

The view shown in FIG. 4 is what is sometimes referred to as the “back side” of sheet 60, i.e., the side 65 of sheet 60 that forms an interior surface of the microwaveable popcorn package 1, FIG. 1. The side opposite the side view in FIG. 4 is sometimes referred to as the “front side,” and may form an exterior surface of microwaveable popcorn package 1. Additionally, the mirror image arrangement is possible.
Still referring to FIG. 4, line segment 62 defines a region 63 within which, for preferred embodiments, most of the microwave interactive material, such as a microwave interactive material in construction 45, FIG. 5, may be associated. The microwave interactive construction, for example, interactive construction 45, FIG. 5, may be positioned on an interior, an exterior, or between plies 46, 47. For typical embodiments microwave interactive construction 45 is positioned between plies 46, 47 of the blank 60.

Between plies 46, 47 a variety of adhesive patterns may be utilized. Examples are described in PCT WO 2005/080225, incorporated herein by reference.

Still referring to FIG. 4, line 66 generally indicates where fold 34, FIG. 5, may be formed and line 67 generally indicates where fold 39, FIG. 5, may be formed. Folds or creases 34, 39 are generally outwardly directed folds or creases in opposite side gussets 22, 23 adjacent to face 21. Surface 21a, FIG. 5, for positioning a popcorn kernel charge, when in use extends between the folds 34, 39. Line 68 corresponds to fold 35 (FIG. 5), line 69 with fold 40 (FIG. 5), line 70 with fold 33 (FIG. 5), and line 71 with fold 38 (FIG. 5). Region 75, between fold lines 66 and 68, generally defines gusset panel section 49, FIG. 5, and region 77, between fold lines 67 and 69, would generally define gusset panel section 48, FIG. 5.

In general, the microwaveable popcorn package 1 is eventually formed by folding the microwaveable popcorn package 1 such that it folds along appropriately spaced regions perpendicular to lines 66, 67, 68, 69, 70, 71. It will be understood that the latter folding may generally be after the bag construction has been otherwise assembled.

Referring to FIG. 4, sealant field 84, along edge 84a and positioned on an opposite side of panel 60, from side 65, is used to engage field 85 along edge 85a during folding, (typically with applied heat and pressure) for forming the longitudinal seam as seen at 42, FIG. 5. It will be apparent that, during folding, various portions of field 89 along edge 89a of side 65 may line up with each other to form various portions of end seal 90, FIG. 2 (typically with application of heat and pressure), and various portions of field 92, along edge 92a on side 65, FIG. 4, may align with one another to form end seal 93, typically with an application of heat and pressure. In general, field 92 may form a top edge 93 of the completed bag, through which popped popcorn may be removed after popping. Sealant fields 95 and 96, on the opposite side of the panel 60, FIG. 4, may align with one another when folding around fold line 68 is conducted, and heat and pressure are applied, to help secure panel 60 in a preferred configuration, along end long 90, FIG. 2, after folding. This is analogous to what was done in U.S. Pat. No. 5,195,829, FIG. 1a. Similarly, sealant fields 98 and 99, on the underside of panel 60, FIG. 4, align with one another when the panel is folded around fold line 69 for providing a secure end configuration at 90, FIG. 2, when heat and pressure are applied.

Attention is now directed toward sealant fields 103, 104, 105, 106, 107, 108, 109, and 110. Analogous fields may be seen in PCT WO 2005/080225 and 2006/004906, both incorporated herein by reference. During folding, portions of fields 103-110 align with one another to retain selected portions of the panel adhered to one another, typically after application of pressure and heat, to provide for expansion. In particular, field 103 engages field 104; field 105 engages field 106; field 108 engages field 107; and field 110 engages field 109 during folding and after application of pressure and heat. Engagement of fields 105, 106, 107, and 108 tend to retain selected portions of panels 48 and 49 against panel 21, FIG. 4. Sealant field 103 folded against field 104, and field 110 folded against field 109, help retain panels 115 and 116 sealed against panel 20, FIG. 5, in the collapsed microwaveable popcorn package 1. This helps to assure that the popcorn charge 30, FIG. 5, is retained where desired in the arrangement. Advantages from this are described in part in U.S. Pat. No. 5,195,829 and in PCT WO 2005/080225 and 2006/004906, all incorporated herein by reference.

It is noted that for the bag arrangement in U.S. Pat. No. 5,195,829, several fields adjacent to regions 92 were utilized. For the arrangements reflected by FIG. 4, these were not shown. It is expected that such fields would not be used in preferred arrangements. However, they may optionally be used.

Attention is now directed to sealant fields 129, 130, 133, and 134. In typical bags, these sealant fields are used to ensure that panels 115 and 116 are seated against panel 20, FIG. 5, so that the popcorn charge 30 is substantially retained in tube 29, FIG. 5, and does not expand or spread substantially into tube 28 until desired during heating. In particular, fields 129 and 130 are oriented to engage one another when the arrangement is folded about fold line 70 with the application of heat and pressure. Fields 133 and 134 are oriented to engage one another, when the arrangement is folded about fold line 71 (with application of heat and pressure). Seals of the types associated with fields 129, 130, 133, 134 have been used in previous constructions. For example, see U.S. Pat. No. 5,044,777, incorporated herein by reference.

In general, sealing results from application of heat and pressure, after folding, to the region where the seal is located. It is noted that for the various seals discussed, a sealant is positioned on both adjoining paper surfaces. However, in the event a sealant is only positioned on one side, and the two sides are folded together to follow application of appropriate heat and pressure, a seal may be formed. It is noted the sealant fields discussed are configured to form seals with application of heat and pressure. Alternate types of seals, for example, cold seals, may be implemented in arrangements according to the present disclosure.

In the remaining discussion of sealant fields and surface 65 and package arrangements 60, FIG. 4, options are provided for preferred management and control of wicking and flow characteristics of the oil/fat(s) (i.e., the slurry) in the popcorn charge during storage, handling, and use. It is noted that the seals and fields may be used in one of two ways. First, sealant fields may actually be used to form an insulating seal, to manage the location of oil/fat(s) by insulating it from portions of the package. Secondly, an application of the seal to a paper surface changes the surface tension properties of a surface, thus its interaction with the oil/fat(s) material. In general, the properties of the seal are used to operate for some containment of the oil/fat(s) material into untreatable locations. Thus, sealant fields may be applied to the paper at preferred locations where it is desirable to inhibit flow of the oil/fat(s) material as it liquefies. Both of these properties may be used. Examples of
the techniques described are provided in PCT WO 2005/080225, published Sep. 1, 2005, incorporated herein by reference.

[0115] For the example shown in FIG. 4, fields 151, 152 are oriented to engage one another, with application of heat and pressure, during folding about fold line 66. Fields 153, 154 are oriented to engage one another, with application of heat and pressure, during folding about fold line 67. The seats resulting from fields 151, 152 and 153, 154, may protect against flow of oil/fat into the popcorn charge position in region 63 in the closed, folded popcorn package, from flowing to guzzet folds 39, 34, FIG. 5. This may help inhibit leakage during storage and use, since damage to microwaveable popcorn package 1, allowing for leakage, typically occurs where creasing takes place.

[0116] The particular package blank 60 depicted in FIG. 4, is configured for manufacture of a full size or regular size popcorn bag. The dimensions indicated by the letters in FIG. 4 are as follows: CA=19.1250 inches; CB=3.1875 inches; CC=1.7188 inches; CD=1.7188 inches; CE=5.8750 inches; CF=1.7188 inches; CG=1.7188 inches; CH=3.1875 inches; CI=0.5 inches; CJ=3.9375 inches; CK=0.25 inches; CL=0.2 inches; CM=1.1562 inches; CN=0.8579 inches; CO=1.4375 inches; CP=1.1875 inches; CQ=2.375 inches; CR=2.5625 inches; CS=0.9375 inches; CT=0.1875 inches; CU=0.5 inches; CV=4.0 inches; CX=5.8750 inches; CY=4.5313 inches; CZ=4.0 inches; DA=0.75 inch diameter; DB=1.8438 inches; DC=3.6250 inches; DD=5.8125 inches; DE=0.5 inches; DF=0.5 inches; DG=0.25 inches; DH=0.375 inches; DI=0.125 inches; DJ=0.25 inches; DK=2.9375 inches; DL=0.125 inches; DM=0.25 inches; DN=1 inch; DO=0.625 inches; DP=0.2188 inches; DQ=0.0625 inches; DR=0.625 inches; and DS=11.625 inches, other dimensions may be taken from scale.

[0117] Again, a variety of package arrangements may be utilized. An example depicted in FIG. 4 for a package blank being an example. Some usable alternatives are described in PCT WO 2005/080225, incorporated herein by reference. Still others may be used with applications and the techniques described herein without departing from the scope and spirit of the invention.

[0118] In FIG. 4A, package blank 60M may be configured into a mini bag in accord with the general descriptions above. The various sealant fields indicated have analogous purposes to those described above for package blank 60. FIG. 4. In FIG. 4A, the various dimensions indicated are as follows: AA=19.125 inches; AB=3.1875 inches; AC=1.7188 inches; AD=1.7188 inches; AE=5.8750 inches; AF=1.7188 inches; AG=1.7188 inches; AH=3.1875 inches; AI=0.5 inches; AJ=2.9375 inches; AK=0.25 inches; AL=0.2 inches; AM=1.1562 inches; AN=1.4375 inches; AO=0.8579 inches; AP=1.875 inches; AQ=2.375 inches; AR=5.875 inches; AS=2.375 inches; AT=2.25 inches; AU=0.9375 inches; AV=1.875 inches; AW=2.5 inches; BX=2.9375 inches; BCX=0.25 inch; BD=0.125 inches; BE=0.5 inches; BF=0.25 inches; BG=0.5 inches; BH=1 inch; BI=0.25 inches; BJ=0.625 inches; BK=0.2188 inches; BL=0.0625 inches; BM=0.625 inches; and BO=0.75 inch diameter. Other dimensions may be taken from scale.

[0119] In FIG. 6, an application of the second step additive to popped popcorn from a first step of processing is shown. More specifically, the microwaveable popcorn package 1 of FIG. 2 will have been exposed to microwave energy, typically on a high for about 1-5 minutes, for popping the popcorn within the microwaveable popcorn package 1. The package or pouch 1 will have been opened, for purging the popped popcorn into a bowl 200. FIG. 6, for example. In FIG. 6, the popped popcorn is indicated at 201. Second additive packet 4 is shown torn open. The process step depicted is a step of sprinkling or pouring second step additive 205 onto the popped popcorn 201. The resulting treated popcorn 206, in the bowl, will then be placed in a microwave oven and exposed to a high setting of microwave energy for about 10-45 seconds, typically 20-35 seconds, for converting the additive 205 to the glazed form. The bowl with glazed popcorn may then be removed from the oven for consumption.

[0120] In FIG. 7, a tub product 300 for application of the techniques described herein is shown. Tub product 300 comprises a paperboard container 301 and a flexible balloon 302. A microwave charge is typically contained within tub product 300, usually within a subpackage positioned in central region 203 underneath balloon 302. Also depicted is a removable second step additive pouch 301. Before a first popping step, the pouch 310 will be separated from the remainder of the package 300. The package will be positioned in a microwave oven and energy applied to pop popcorn. During the popping process, the balloon 302 will invert. After removal from the oven, the balloon remnant(s) may be removed. The second step additive package 310 may be sprinkled over the popcorn, and the tub with the popped popcorn will be repositioned within the microwave oven for the second step process for converting the particulate to a glaze, typically 10-45 seconds on high, usually 20-35 seconds.

IV. EXAMPLES

[0121] For the examples described, packaging in accord with FIGS. 1 and 2 may be made, for example, in accord with the specific example of FIGS. 3, 4 and/or 5, or other examples as described in PCT application WO 2005/080225, incorporated herein by reference. The package blank 60 may be formed for a regular popcorn charge (unpopped kernels) of about 65 grams. Example dimensions for such package blanks are described above.

[0122] The components for the popcorn slurry within the bag may comprise corn, oil, sucrose, and salt in amounts as follows: unpopped microwave popcorn, 65 grams; oil (palm), 25 grams; sweetener (sucrose), 0.02 gram; salt (sodium chloride), 0.6 gram. Alternatively, the salt may be provided in the second step addition pouch.

[0123] In an embodiment, a cotton candy glaze is added to microwave popcorn. In this embodiment, the slurry within the popcorn bag is provided a cotton candy flavor, for example, American candy flavor Gin No. 616001, available from Chris Hansen of Milwaukee, Wis., 53214, in an amount of 0.3 gram per package. Additionally, a glaze coloring, Red Lake Dispersion OD-007, available from Chris Hansen of Milwaukee, Wis., 53214, is provided in an amount, within the slurry, of 0.4 gram. The glazing composition is provided within the second step addition pouch. The glazing composition comprises 20 grams of cotton candy flavor Ultra Seal product, available from Gaivadon in Cin-
In addition, the pouch includes cotton candy colored starch pieces, for providing a desirable color, hue, or effect to the overall popcorn. The colored starch includes 3 grams of starch pieces available under the designation COTCANDYKR01, from QA Products, Inc., Elk Grove Village, Ill., 60007.

In some embodiments, the sucralose may be left out of the slurry in the popcorn bag with the microwavable popcorn and provided in the glazing composition.

Utilization of the product may involve a first step of popping the microwave popcorn package, including the popcorn kernels and slurry, in a microwave oven, typically on a high setting for a period of 1-5 minutes or until the sound of popping kernels stops. The bag may be removed from the oven, opened, and the contents poured into a bowl. The second step addition pouch may be opened and the contents sprinkled over the popcorn. Some shaking or stamping of the bowl may be used for facilitating glaze distribution. The bowl of popped popcorn may then be replaced in the microwave oven, set on high for a period of about 20-30 seconds. The bowl of popcorn may be removed for consumption of the popcorn. The popcorn now displays a glaze generally in accord with the glazed popcorn product.

An alternate formulation, for providing a similar appearance, utilized in the same manner described above, may include a microwave popcorn bag containing 65 grams of unpopped microwave popcorn kernels, 25 grams of oil (palm), 0.02 grams of sucralose, and selected flavors and colors. Included in the alternate formulation, the second step addition pouch may comprise 20 grams of Ultra Seal Red Hot Cinnamon, available from Gaivadon, Cincinnati, Ohio, and 3 grams of SEQUIN 01 Bright 02 starch pieces, available from QA Products, Inc., Elk Grove Village, Ill. This product may be utilized in a manner similar to the previously described product.

V. TECHNIQUES APPLICABLE FOR ONE-STEP GLAZED POPCORN PRODUCTS

Using certain techniques characterized previously, it is possible to develop an acceptable, one-step glaze microwave popcorn product. By one-step in this context it is meant that there is only a single exposure to microwave energy, i.e., the popcorn is popped with the result being a glazed popcorn product. In a one-step glazing process, the glazing composition is included in the microwave popcorn package with the unpopped popcorn kernels and the popping slurry.

A significant issue with respect to provision of a one-step microwave glazed popcorn process is the glazing blend must be stable for a prolonged exposure to microwave energy and heat under popping conditions, typically 1.5-5 minutes in the microwave oven, as opposed to a mere 10-45 seconds for the two-step approach. It is also a general requirement that there be little or no salt in the entire contents of the popcorn bag or there may be burning or scorching problems with the ultimate product. This substantially limits the number of flavor variations possible the amount of salt that may be used as a flavor enhancer. With a one-step glaze microwave popcorn process, the contents of the microwave popcorn bag, minus kernels, typically include no more than about 1%, by weight, added edible salt (sodium chloride), and preferably no more than 0.25% by weight added edible salt, and often no added edible salt.

In a system involving no added edible salt, it has been found that a one-step glazed microwave popcorn product may be formulated, utilizing a glazing composition similar to that described above for the two-step application. Such glazing compositions are generally sufficiently stable under extended microwave exposure as long as salt amounts and conditions are controlled for use in a typical microwave popcorn product.

Table 2 provides an example one-step composition. It is noted that the partially hydrogenated soybean oil ("PHSO") may be exchanged for an alternate oil, such as palm or other oil.

The formulation provided is meant as an example only. Variations in flavorings and colorings may also be provided.

<p>| TABLE 2 |
|-----------------|------|
| <strong>A ONE-STEP GLAZED MICROWAVE POPCORN PRODUCT COMPOSITION</strong> |</p>
<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Wt % in Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Popped Popcorn Kernels</td>
<td>53.76%</td>
</tr>
<tr>
<td>2. Slurry</td>
<td></td>
</tr>
<tr>
<td>a. Ultra Seal Glaze Blend</td>
<td>7.67%</td>
</tr>
<tr>
<td>b. Caramel Powder</td>
<td>2.57%</td>
</tr>
<tr>
<td>c. Lecithin</td>
<td>0.51%</td>
</tr>
<tr>
<td>d. Oil (for ex. PHSO)</td>
<td>35.45%</td>
</tr>
<tr>
<td>e. Sucralose</td>
<td>0.04%</td>
</tr>
</tbody>
</table>

An example product may comprise a mini bag, a regular size bag, and/or a tub. A variety of colors or alternate flavors may be used as long as they are stable under the conditions of microwave popping.

In more general terms, a typical composition may comprise 50% to 80% popcorn; 7% to 20% glaze blend; 0.05%-0.2%, by wt., microwave stable sweetener, such as sucralose; 5% to 30% oil; and 0.5% to 3% additional flavorant and/or colorant. In some instances, an emulsifier, such as lecithin, may be used in an amount of 0.25% to 2%, for facilitating formation of the slurry and distribution of the popcorn.

It is believed that the present invention and many of its attendant advantages will be understood by the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages. The form herein before described being merely an explanatory embodiment thereof, it is the intention of the following claims to encompass and include such changes.

What is claimed is:

1. A microwave popcorn product for providing a glazed microwave popcorn, comprising:

   a first package including unpopped popcorn kernels and a slurry, the first package for heating in a microwave oven for producing popped popcorn flakes, and
a second package including a glazing blend,

wherein the glazing blend is for distributing on the popped popcorn flakes for providing the glazed microwaveable popcorn.

2. The microwave popcorn product in claim 1, wherein the glazing blend comprises a range of about 6% to about 60% of the edible glazed popcorn comprises based on weight of the unpopped kernels in the microwave popcorn package.

3. The microwave popcorn product in claim 1, wherein the glazing blend comprises a material having a glass transition temperature of at least about 68° C. and no more than about 83° C.

4. The microwave popcorn product in claim 1, wherein the first microwave popcorn package is an expandable bag.

5. The microwave popcorn product in claim 1, wherein the first microwave popcorn package and the second addition package are stored in a storage over-wrap.

6. The microwave popcorn product in claim 1, wherein the glazing blend is formed by spray drying an aqueous dispersion including at least one of a sugar, a hydrolyzed starch, a sucralose, a maltodextrin, a modified starch, and an emulsifier.

7. The microwave popcorn product in claim 1, wherein the second package includes colored starch pieces.

8. The microwave popcorn product in claim 1, wherein the first package further comprises unpopped popcorn kernels, and a slurry in an amount of 90-130%, by weight based on the weight of popcorn kernels.

9. The microwave popcorn product in claim 8, wherein the first package includes at least one of a sweetening effective amount of sucralose and an edible salt in an amount no greater than 2%, by weight based on the weight of unpopped popcorn kernels.

10. The microwave popcorn product in claim 8, wherein the slurry further comprises at least one of an oil, a fat, a salt, a coloring, and a flavoring.

11. The microwave popcorn product in claim 1, wherein the slurry further comprises:

   an edible oil, in an amount ranging between about 85% (wt.) and about 97% (wt.) of the slurry,
   a sweetener, in an amount ranging between about 0.004% (wt.) and about 0.3% (wt.) of the slurry,
   a flavoring, in an amount ranging between about 0.1% (wt.) and about 2.0% (wt.) of the slurry,
   a color, in an amount ranging between about 0.1% (wt.) and about 2.0% (wt.) of the slurry, and
   a salt, in an amount ranging less than about 2.0% (wt.) of the slurry.

12. A microwave popcorn product for providing a glazed microwave popcorn, comprising:

   a charge of unpopped microwave popcorn kernels, in an amount ranging from about 50% to about 80% by weight of a total microwave popcorn product,
   an edible oil in an amount ranging from about 5% to about 30%, by weight of the total microwave popcorn product,
   a charge of sweetener,
   a glazing blend for providing a popcorn glaze, and
   a microwaveable package suitable for containing the charge of unpopped microwave popcorn kernels, the slurry, the charge of sweetener, and the glazing blend,

wherein the microwaveable package is for placing in a microwave oven, for popping the unpopped microwave popcorn kernels, and the glazing blend is for dispensing on the popped popcorn.

13. The microwave popcorn product in claim 12, wherein the glazing blend further comprises a spray dried aqueous dispersion including at least one of a sugar, a hydrolyzed starch, a sucrose, a maltodextrin, a modified starch, and an emulsifier.

14. The microwave popcorn product in claim 12, further comprising an edible salt in an amount of no greater than 0.25% by weight based on weight of the total microwave popcorn product.

15. The microwave popcorn product in claim 12, wherein the glazing blend is in a particulate form and at least 80% by weight of the particles have a mean particle size between about 50 and 300 microns.

16. The microwave popcorn product in claim 12, wherein the sweetener is sucralose.

17. The microwave popcorn product in claim 12, wherein the microwave bag is expandable.

18. The microwave popcorn product in claim 12, further including colored starch pieces.

19. The microwave popcorn product in claim 12, further including a flavoring, wherein the flavoring is in an amount ranging from about 0.5% (wt.) to about 2% (wt.) of the total package.

20. The microwave popcorn product in claim 12, further including a coloring, wherein the coloring is in an amount ranging from about 0.5% (wt.) to about 2.0% (wt.) of the total package.

21. A process for providing a glazed microwave popcorn product, comprising:

   forming popped popcorn by popping popcorn kernels included in a microwave popcorn package, in a microwave heating step, and distributing a glazing blend over the popped popcorn, the glazing blend disposed in a second package,

   wherein the glazing blend is heated in the second package containing the glazing blend in a second microwave heating step, and the glazing blend is poured on the popped popcorn.

22. The process in claim 21, wherein the glazing blend is heated in a second microwave step, comprising exposure to microwave energy for about 10 to 45 seconds.

23. The process in claim 21, wherein after the step of forming popped popcorn and before the step of distributing the glazing blend, the popped popcorn is removed from the microwave popcorn package and placed in a bowl for subsequent heating and mixing of the popped popcorn and glazing blend.

24. The process in claim 21, wherein the glazing blend further comprises colored starch pieces.

25. A process for providing a glazed microwave popcorn product, comprising:

   placing a charge of unpopped popcorn kernels in a microwaveable package,

   placing a charge of oil/fat based slurry in the microwaveable package,
placing a charge of a particulate glazing blend in the microwaveable package, and

forming popped popcorn by popping the unpopped popcorn kernels, on which a glaze coating is distributed by the popping action and heating of the particulate glaze, creating a glazed microwave popcorn product in the microwave popcorn package.

26. The process in claim 25, wherein the glazing blend further comprises a particulate glazing blend included with the popcorn kernels, and at least 80% by weight of the particles in the particulate glazing blend are within the mean particle size ranging from about 50 to about 300 microns.

27. The process in claim 25, wherein the charge of particulate glazing comprises a spray dried aqueous dispersion including at least one of a sugar, a hydrolyzed starch, a sucrose, a maltodextrin, a modified starch, and an emulsifier.

28. The process in claim 25, wherein the charge of particulate glazing further comprises colored starch pieces.

29. A microwave popcorn product for providing a glazed microwave popcorn, comprising:

- a charge of unpopped microwave popcorn kernels, in an amount ranging from about 50% to about 80% by weight of the microwave popcorn product,

- an edible oil in an amount ranging from about 5% to about 30%, by weight of the microwave popcorn product,

- a charge of sweetener, in an amount ranging from about 0.05% to about 0.2%, by weight of the microwave popcorn product,

- at least one of a flavorant and a color, in an amount ranging from about 0.5% to about 3%, by weight of the microwave popcorn product,

- a glazing blend for providing a popcorn glaze, in an amount ranging from about 7% to about 20% of the microwave popcorn product, and

- a microwaveable package suitable for containing the charge of unpopped microwave popcorn kernels, the slurry, the charge of sweetener, and the glazing blend,

wherein the microwaveable package is for placing in a microwave oven, for popping the unpopped microwave popcorn kernels, and the glazing blend is for dispersing on the popped popcorn.

30. The microwave popcorn product in claim 29, further comprising an emulsifier, in an amount ranging from about 0.25% to about 2%, by weight of the total microwave popcorn product.

31. The microwave popcorn product in claim 30, wherein the emulsifier is lecithin.