[0011] Compositions according to the instant disclosure that contain theobromine for treating and/or reducing dentinal hypersensitivity include but are not limited to: toothpaste, mouthwash, dental floss, over the counter trays, coated strips, gels, orthodontic and pediatric varnishes, dental cements or adhesives, polishing/prophylaxis pastes, tooth bleaching agents, cavity filling materials and resins (both UV and non-UV reactive), and endodontic materials including gutta percha.

[0012] Foods of particular interest for the reduction of dentinal hypersensitivity include, but are not limited to: gums, mints, tooth-friendly candies, chews, breads, ready to eat cereals, oatmeal, sports and isotonic beverages, energy drinks, meal replacement beverages (non-milk and milk based), vitamin or enhanced bottled waters, tea, soy milk, gelatins, yogurts, yogurt drinks, fruit smoothies, powdered or liquid flavored drinks, and calcium chews.

**[0013]** In one ~~aspect~~embodiment, there is provided an oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

**[0014]** In one ~~aspect~~embodiment, there is provided a method of reducing oral sensitivity comprising applying to the surface of a mammalian tooth an oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

**[0014a]** In one aspect, there is provided the use of an oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for reducing oral sensitivity, wherein the medicament is to be applied to the surface of a mammalian tooth.

**[0014b]** In one ~~aspect~~embodiment, there is provided the oral care composition as defined herein for use in reducing oral sensitivity of a mammalian tooth.

**[0015]** In one ~~aspect~~embodiment, there is provided a method of maintaining or increasing the systemic health of a mammal comprising applying a composition to an oral surface of a mammal at least once a day for a duration of time, wherein the composition comprises: a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine; b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof; c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate,

sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

**[0015a]** In one ~~aspect~~embodiment, there is provided the use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for maintaining or increasing the systemic health of a mammal, wherein the medicament is to be applied to an oral surface of a mammal at least once a day for a duration of time.

**[0015b]** In one ~~aspect~~embodiment, there is provided the oral care composition as defined herein for use in maintaining or increasing the systemic health of a mammal or an oral surface of said mammal.

**[0016]** In one ~~aspect~~embodiment, there is provided a method of occluding a dentinal tubule within the surface of a mammalian tooth comprising applying to the tooth surface a composition comprising: a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine; b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof; c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

**[0016a]** In one ~~aspect~~embodiment, there is provided the use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for occluding a dentinal tubule within a mammalian tooth, wherein the medicament is to be applied to the tooth surface.

**[0016b]** In one ~~aspect~~embodiment, there is provided the oral care composition as defined herein for use in occluding a dentinal tubule within a mammalian tooth.

**[0017]** In one ~~aspect~~embodiment, there is provided a method of depositing a precipitate on the surface of a mammalian tooth comprising applying to the tooth surface a composition comprising: a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine; b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof; c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

**[0017a]** In one ~~aspect~~embodiment, there is provided the use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for depositing a precipitate on the surface of a mammalian tooth, wherein the medicament is to be applied to the tooth surface.

**[0017b]** In one ~~aspect~~embodiment, there is provided the oral care composition as defined herein for use in depositing a precipitate on the surface of a mammalian tooth.

**[0018]** The composition may have a pH of from about 3 to about 11, from about 4 to about 10, from about 5 to about 9, from about 6 to about 8.5, from about 6 to about 8, from about 6.5 to about 7.5, about 7, from about 7 to about 11, from about 8 to about 11, from about 8 to about 10, from about 8.5 to about 9.5, about 9, from about 3 to about 7, from about 3 to about 6, from about 3 to about 5, preferably from about 4 to about 5, more preferably from about 4.5 to about 4.8, and even more preferably about 4.8.

**[0019]** The composition may further comprise at least one isotonic agent. The isotonic agent may be a polyhydric alcohol. The polyhydric alcohol may be selected from the group consisting of xylitol, sorbitol, mannitol, maltitol, lactitol, isomalt, erythritol, arabitol, glycerol, and combinations thereof. The composition of said method may further comprise at least one thickener. The thickener may be selected from the group consisting of methyl cellulose, carboxymethyl cellulose, ethyl cellulose, hydroxypropyl cellulose, and combinations thereof. The composition may further comprise an antibacterial agent, an antimicrobial agent, or combinations thereof. The antibacterial

What is claimed is:

1. An oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

2. A method of reducing oral sensitivity comprising applying to the surface of a mammalian tooth an oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

3. A method of maintaining or increasing the systemic health of a mammal comprising applying a composition to an oral surface of a mammal at least once a day for a duration of time, wherein the composition comprises:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;

c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof

4. A method of occluding a dentinal tubule within a mammalian tooth comprising applying to the tooth surface a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof.

5. A method of depositing a precipitate on the surface of a mammalian tooth comprising applying to the tooth surface a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof,.

6. The oral care composition of claim 1 for use in reducing oral sensitivity of a mammalian tooth.

7. The oral care composition of claim 1 for use in maintaining or increasing the systemic health of a mammal or an oral surface of said mammal.

8. The oral care composition of claim 1 for use in occluding a dentinal tubule within a mammalian tooth.

9. The oral care composition of claim 1 for use in depositing a precipitate on the surface of a mammalian tooth.

10. Use of an oral care composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for reducing oral sensitivity, wherein the medicament is to be applied to the surface of a mammalian tooth.

11. Use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for maintaining or increasing the systemic health of a mammal, wherein the medicament is to be applied to an oral surface of a mammal at least once a day for a duration of time.

12. Use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in

the manufacture of a medicament for occluding a dentinal tubule within a mammalian tooth, wherein the medicament is to be applied to the tooth surface.

13. Use of a composition comprising:
a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for depositing a precipitate on the surface of a mammalian tooth, wherein the medicament is to be applied to the tooth surface.

CLAIMS

WHAT IS CLAIMED IS:

1. Use of an oral care composition comprising:
   a) isolated theobromine, or a salt or double salt thereof, or a co-crystal comprising theobromine;
   b) a source of calcium selected from the group consisting of calcium chloride, calcium carbonate, calcium gluconate, calcium phosphate, calcium acetate, and combinations thereof;
   c) a source of phosphate selected from the group consisting of potassium dihydrogen phosphate, dipotassium hydrogen phosphate, tripotassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, trisodium phosphate, and combinations thereof, in the manufacture of a medicament for reducing oral sensitivity, wherein the medicament is to be applied to the surface of a mammalian tooth.

2. The use of claim 1, wherein after two applications of said composition to said tooth at least 20% of the exposed dentin tubules of said tooth are completely occluded.

3. The use of claim 1, wherein after four applications of said composition to said tooth at least 30% of the exposed dentin tubules of said tooth are completely occluded.

4. The use of claim 1, wherein after six applications of said composition to said tooth at least 40% of the exposed dentin tubules of said tooth are completely occluded.

5. The use of claim 1, wherein after fourteen applications of said composition to said tooth at least 60% of the exposed dentin tubules of said tooth are completely occluded.

6. The use of claim 1, wherein after two applications of said composition to said tooth less than 20% of the exposed dentin tubules of said tooth are fully open.

7. The use of claim 1, wherein after four applications of said composition to said tooth less than 20% of the exposed dentin tubules of said tooth are fully open.

8. The use of claim 1, wherein after six applications of said composition to said tooth less than 10% of the exposed dentin tubules of said tooth are fully open.

9. The use of claim 1, wherein after fourteen applications of said composition to said tooth less than 5% of the exposed dentin tubules of said tooth are fully open.

10. The use of claim 1, wherein after two applications of said composition to said tooth at least 80% of the exposed dentin of said tooth is covered by deposited smear layer.

11. The use of claim 1, wherein after four applications of said composition to said tooth at least 90% of the exposed dentin of said tooth is covered by deposited smear layer.

12. The use of claim 1, wherein after six applications of said composition to said tooth at least 95% of the exposed dentin of said tooth is covered by deposited smear layer.

13. The use of claim 1, wherein after fourteen applications of said composition to said tooth at least 95% of the exposed dentin of said tooth is covered by deposited smear layer.