[17] Spherulitic surfactant systems induced with high levels of electrolytes are opaque and this limits the visual effects that can be achieved and may be perceived as less attractive than a clear system in some applications. This is because light cannot pass through the dense matrix of spherulites. By contrast many liquids and gases are transparent because light can pass more readily between the large spaces between their atoms. Many crystals are both solid and transparent, this is because the atoms of a crystal are arranged in a precise lattice structure, stacked in regular rows, with regular spacing between them and hence there are many pathways that a light beam can take through a crystal lattice. Solids can also become transparent if their atoms are arranged randomly, glass and sugar candy are good examples.

[18] Transparency can be obtained in certain spherulitic surfactant systems by adding high levels of soluble carbohydrate (e.g. sucrose); but the sugar generally needs to be present in undesirably high concentrations, e.g. over 20% to be effective. Such systems are described in more detail in US2004235702.

[19] There is therefore a need, especially in the personal care field, for a suspending system that contains a blend of high foaming surfactants and is transparent and mobile; but which does not require the presence of electrolyte or sugar as a structurant.

BRIEF SUMMARY ~~OF THE INVENTION~~

[20] It has surprisingly been found that transparent structured surfactant suspending systems can be formed by mixing a particular selection of surfactants in particular amounts in the substantial absence of electrolytes or carbohydrates. The transparent structured surfactant systems are particularly useful in personal care compositions to achieve a variety of aesthetically pleasing visual effects. The surfactant systems are mobile, have good suspending power and are phase stable.

[20A] In one aspect, there is disclosed herein an aqueous structured surfactant system comprising: water and a mixture of surfactants, wherein the mixture of surfactants, comprises: at least one surfactant having an HLB value of less than 10 ; and at least one surfactant having an HLB value of 10 or greater, the mixture of surfactants having

an overall HLB value in the range of about 11 to about 13; wherein the mixture of surfactants forms multilamellar vesicles with a droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms; wherein the structured surfactant system is free of electrolytes and polymeric thickeners; and wherein the structured surfactant system is substantially transparent in the absence of any suspended matter and has suspending properties.

[20B] In another aspect, there is disclosed herein a composition comprising the structured surfactant system as described herein.

[20C] In yet another aspect, there is disclosed herein a personal care composition comprising: a structured surfactant system wherein the structured surfactant system comprises a mixture of at least one surfactant having an HLB value of less than 10 and at least one surfactant having an HLB value of 10 or greater, wherein the mixture of surfactants produces multilamellar vesicles with a droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms; at least one of solid, liquid or gaseous particles suspended in the structured surfactant system; and the balance water.

[21] In ~~a first aspect~~one example, the present technology provides a transparent structured surfactant system which is comprised of multilamellar vesicles with a bilayer spacing below 60 angstroms.

[22] In another ~~aspect~~example, the present technology provides an aqueous structured surfactant system comprising water and a mixture of surfactants, wherein the mixture of surfactants, comprises at least one surfactant having an HLB value of less than 10, alternatively less than 8; and at least one surfactant having an HLB value of 10 or greater, the mixture of surfactants having an overall HLB value in the range of about 11 to about 13; wherein the structured surfactant system is free of electrolytes and polymeric thickeners; and wherein the structured surfactant system is substantially transparent in the absence of any suspended matter and has suspending properties.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[23] Figure 1 is an electron micrograph illustrating microvesicles of the structured surfactant system.

DETAILED DESCRIPTION OF THE INVENTION

[24] The present technology relates to a structured suspending system that is based on a lamellar surfactant mesophase. It is transparent, high foaming, can be very low in electrolyte, and can be made without sugar, which makes it ideal for personal care applications. The structured surfactant system comprises water and a mixture of surfactants that form transparent structured liquid compositions in the absence of added electrolytes or carbohydrates. As used herein, the term "transparent" means having the property of transmitting rays of light through its substance so that bodies situated beyond or behind can be distinctly seen. The transparency of the compositions does not preclude the compositions from being colored, for example by the addition of a dye, provided the dye does not detract from the substantial transparency of the composition. Further, the transparency of the compositions does not preclude the compositions from containing various particles to achieve a variety of different effects. For example, mica particles could be suspended in the composition to provide visually pleasing effects, if desired, which would reduce the transparency of the composition. In that case the definition of transparency is applied to the structured liquid composition without the addition of any suspended matter. Transparency can also be measured by methods known in the art. For example, a spectrophotometer can be used to measure the absorption of visible light between 380 and 800 nm. In some embodiments of the

CLAIMS

WHAT IS CLAIMED IS:

1. An aqueous structured surfactant system comprising:

water and a mixture of surfactants, wherein the mixture of surfactants, comprises:

at least one surfactant having an HLB value of less than 10 ; and

at least one surfactant having an HLB value of 10 or greater, the mixture of surfactants having an overall HLB value in the range of about 11 to about 13;

wherein the mixture of surfactants forms multilamellar vesicles with a droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms;

wherein the structured surfactant system is free of electrolytes and polymeric thickeners; and

wherein the structured surfactant system is substantially transparent in the absence of any suspended matter and has suspending properties.

2. The aqueous structured surfactant system of claim 1, wherein the surfactant having an HLB value of less than 10 is selected from glyceryl esters, fatty alcohol ethoxylates, fatty alcohols, fatty acids, and mixtures thereof.

3. The aqueous structured surfactant system of claim 2, wherein the glyceryl esters are glyceryl caprylate/caprate esters.

4. The aqueous structured surfactant system of claims1-3, wherein the surfactant having an HLB value of 10 or greater is selected from amine oxide, alkyl sulfate, alkyl ether sulfate, alpha-sulpho methyl esters, sarcosinates, taurides, propionates, betaines, sulfobetaines, glycinates sodium cholate, alkyl polyglucoside, fatty acid soaps, ethoxylated sorbitan esters, sucrose esters, and mixtures thereof.

~~5. The aqueous structured surfactant system of claims1-4, wherein the structured surfactant system is comprised of multilamellar vesicles with an droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms.~~

6.5. The aqueous structured surfactant system of claims1-54, wherein the structured surfactant system further comprises hydroxyl containing compounds having at least two hydroxyl groups.

7.6. The aqueous structured surfactant system of claim 65, wherein the hydroxyl containing compounds comprise glycerol, a polyglycerol or mixtures thereof.

8.7. The aqueous structured surfactant system of claims 1-7 6 wherein the structured surfactant system further comprises particles of solid, liquid or gas suspended stably within the system.

9.8. The aqueous structured surfactant system of claims1-87, wherein the ratio of the at least one surfactant having an HLB value of less than 10 to the at least one surfactant having an HLB value of 10 or greater present in the system is from about 4:1 to about 1:4.

10.9. A composition comprising the structured surfactant system of any of claims 1-98.

11.10. The composition of claim 109, wherein the composition is a personal care composition, a pharmaceutical preparation, a laundry composition, a fabric softener composition, an agricultural composition, or a hard surface cleaner.

12.11. A personal care composition comprising:

a structured surfactant system wherein the structured surfactant system comprises a mixture of at least one surfactant having an HLB value of less than 10 and at least one surfactant having an HLB value of 10 or greater, wherein the mixture of surfactants produces multilamellar vesicles with a droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms;

at least one of solid, liquid or gaseous particles suspended in the structured surfactant system; and

the balance water.

13.12. The personal care composition of claim 1211, wherein the surfactant having an HLB value of less than 10 comprises glycerol esters.

~~14.~~13. The personal care composition of claim ~~12~~ 11 or ~~13~~12, wherein the surfactant having an HLB value of 10 or greater comprises amine oxide, alkyl sulfate, alkyl ether sulfate, alkyl polyglucoside, fatty acid soaps, ethoxylated sorbitan esters, sucrose esters, or mixtures thereof.

~~15.~~14. The personal care composition of any one of claims ~~12~~ 11 to ~~14~~13, wherein the composition further comprises at least one hydroxyl containing compounds having at least two hydroxyl groups.

~~16.~~15. The personal care composition of claim ~~15~~14, wherein the hydroxyl containing compound comprises glycerol, a polyglycerol or mixtures thereof.

~~17. A transparent structured surfactant system which is comprised of multilamellar vesicles with a droplet size of less than 2500 angstroms and a bilayer spacing below 60 angstroms.~~

16. The aqueous structured surfactant system of any one of claims 1-8, wherein the mixture of surfactants comprises from 5% to 40% by weight of the structured surfactant system.