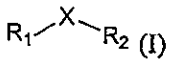
CLAIMS

1. A method of treating scalp hair comprising the step of:

applying to said hair a non-toxic composition comprising a non-perfluorinated, non-polymeric compound of formula (I) and a cosmetically acceptable excipient



(I)

wherein X is selected from the group consisting of CH_2, $CHCH_3$, and CCH_3CH_3

wherein R_1 and R_2 are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; C_1-C_{20} heteroaryl; -OC(=O)R, wherein R is an alkenyl radical; $-COOR_A$; $-C(=O)R_A$; $-OH$; $-NR_BR_C$; and $-CONR_BR_C$, wherein R_A, R_B and R_C are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl, which groups may be substituted or unsubstituted, and

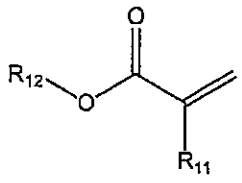
wherein R_1 and R_2 may be substituted or unsubstituted, provided that R_1 and R_2 taken together contain at least three carbon atoms; R_1 and R_2 taken together are substituted with a total of at least four fluorine atoms; and R_1 and R_2 taken together contain no more than one aromatic ring structure; provided that the compound of formula (I) does not contain an Si-O bond; is not a polyether, a fluorinated acid, an oxyacetamide, or a carbonate, and

wherein the composition does not contain a free radical initiator, a polymerization initiator or a polymerization catalyst.

2. The method according to claim 1, wherein at least one of R_1 and R_2 is substituted with at least one of $-COOR_A$, $-C(=O)R_A$, $-OH$, $-NR_BR_C$ or $-CONR_BR_C$,

wherein R_A, R_B and R_C are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl, which groups may be substituted or unsubstituted.

3. The method according to claim 1, wherein the compound is a compound according to formula (II):



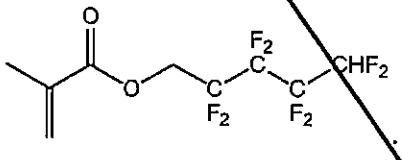
(II)

wherein R_{11} is hydrogen or methyl optionally substituted with up to two fluorine atoms; and

R_{12} is a methylene containing radical selected from the group consisting of: cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl.

4. The method according to claim 1, wherein the compound is selected from the group consisting of 2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl dimethacrylate; 2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl diacrylate; 1H,1H,11H-eicosafluoroundecyl acrylate; 1H,1H,11H-eicosafluoroundecyl methacrylate; 2,2,3,3,4,4,5,5-octafluoropentyl methacrylate; 2,2,3,3,4,4,5,5-octafluoropentyl acrylate; 2,2,3,3,4,4-hexafluoro-1,5-pentyl diacrylate; 2,2,3,3,4,4-hexafluoro-1,5-pentyl dimethacrylate; 1H,1H,7H-dodecafluoroheptyl acrylate; and 1H,1H,7H-dodecafluoroheptyl methacrylate.

5. The method according to claim 1, wherein the compound is:



.

6. The method according to claim 1, wherein said method does not employ a step consisting of rinsing said hair after applying said composition.

7. The method according to claim 1, wherein the method does not further employ a step of (i) applying a composition containing more than about 0.1% weight/weight of a uv-

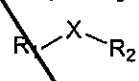
activated free radical initiator that is activated under ambient light, or (ii) applying a composition containing more than about 0.01% weight/weight of a free radical initiator selected from the group consisting of a heat-activated initiator that is activated at or above ambient temperature and an initiator that is active at ambient temperature.

8. The method according to claim 1, wherein hair treated with the composition resists moisture penetration, characterized by at least 4 percent decreased moisture flux.

9. The method according to claim 1, wherein hair treated with the composition resists dirt, characterized by no more than 15 percent weight gain.

10. The method according to claim 1, wherein hair treated with the composition affords a weightless feeling on the hair, characterized by at least 50% weight loss.

11. A non-toxic hair care composition comprising a non-perfluorinated, non-polymeric compound of formula (I) and a cosmetically acceptable excipient



(I)

wherein X is selected from the group consisting of CH_2, $CHCH_3$, and CCH_3CH_3

wherein R_1 and R_2 are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; C_1-C_{20} heteroaryl; -OC(=O)R, wherein R is an alkenyl radical; $-COOR_A$; $-C(=O)R_A$; $-OH$; $-NR_BR_C$; and $-CONR_BR_C$, wherein R_A, R_B and R_C are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl, which groups may be substituted or unsubstituted, and

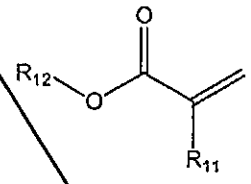
wherein R_1 and R_2 may be substituted or unsubstituted, provided that R_1 and R_2 taken together contain at least three carbon atoms; R_1 and R_2 taken together are substituted with a total of at least four fluorine atoms; and R_1 and R_2 taken together contain no more than one aromatic ring structure; provided that the compound of formula (I) does not contain an Si-O bond; is not a polyether, a fluorinated acid, an oxyacetamide, or a carbonate, and

wherein the composition does not contain a free radical initiator, a polymerization initiator or a polymerization catalyst.

12. The hair care composition according to claim 11, wherein at least one of R_1 and R_2 is substituted with at least one of $-COOR_A$, $-C(=O)R_A$, $-OH$, $-NR_BR_C$ or $-CONR_BR_C$,

wherein R_A, R_B and R_C are independently selected from the group consisting of: hydrogen; cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl, which groups may be substituted or unsubstituted.

13. The hair care composition according to claim 11, wherein the compound is a compound according to formula (II):



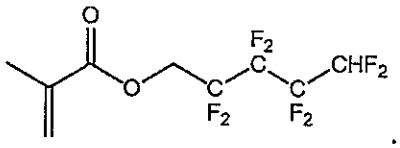
(II)

wherein R_{11} is hydrogen or methyl optionally substituted with up to two fluorine atoms; and

R_{12} is a methylene containing radical selected from the group consisting of: cyclic or acyclic C_1-C_{20} aliphatic; cyclic or acyclic C_1-C_{20} heteroaliphatic; cyclic or acyclic C_1-C_{20} acyl; C_1-C_{20} aryl; and C_1-C_{20} heteroaryl.

14. The hair care composition according to claim 11, wherein the compound is selected from the group consisting of 2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl dimethacrylate; 2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl diacrylate; 1H,1H,11H-eicosafluoroundecyl acrylate; 1H,1H,11H-eicosafluoroundecyl methacrylate; 2,2,3,3,4,4,5,5-octafluoropentyl methacrylate; 2,2,3,3,4,4,5,5-octafluoropentyl acrylate; 2,2,3,3,4,4-hexafluoro-1,5-pentyl diacrylate; 2,2,3,3,4,4-hexafluoro-1,5-pentyl dimethacrylate; 1H,1H,7H-dodecafluoroheptyl acrylate; and 1H,1H,7H-dodecafluoroheptyl methacrylate.

15. The hair care composition according to claim 11, wherein the compound is:



16. The hair care composition according to claim 11, wherein the cosmetically acceptable excipient comprises a rheology modifier and a non-ionic emulsifier,

wherein the rheology modifier is selected from the group consisting of glyceryl polyacrylate, sodium polyacrylate, carbomer, acrylates copolymer, acrylic acid/vp crosspolymer, and xanthan gum; and

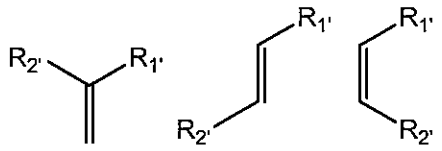
the non-ionic emulsifier is selected from the group consisting of Laureth-23, Ocyldodeceth-20, Oleth-10, Peg-40 Hydrogenated Castor Oil, Polaxomer 127, Polysorbate 20, and Ceteareth-20.

CLAIMS

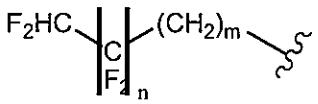
1. A cosmetic method of treating scalp hair comprising the step of:

applying to said hair a non-toxic composition comprising a fluorinated, non-polymeric compound of formula (I) with a cosmetically acceptable excipient,

wherein the compound is according to one of the formulae:



wherein $R_{1'}$ is $-CO_2R_{A'}$; and wherein $R_{A'}$ is



,

wherein n is an integer between 0 and 20, inclusive; and m is an even or odd integer between 1 and 6, inclusive; and

$R_{2'}$ is selected from the group consisting of hydrogen; halogen; cyclic or acyclic, substituted or unsubstituted, branched or unbranched aliphatic; cyclic or acyclic, substituted or unsubstituted, branched or unbranched heteroaliphatic; substituted or unsubstituted, branched or unbranched acyl; substituted or unsubstituted aryl; substituted or unsubstituted heteroaryl; $-OR_{A'}$; $-C(O)R_{A'}$; $-CO_2R_{A'}$; $-C(O)N(R_{A'})_2$; $-SR_{A'}$; $-SOR_{A'}$; $-SO_2R_{A'}$; $-NR_{A'}$; $-N(R_{A'})_2$; $-NHC(O)R_{A'}$; and $-C(R_{A'})_3$; and wherein each occurrence of $R_{A'}$ is independently selected from a group consisting of hydrogen, cyclic or acyclic, substituted or unsubstituted, branched or unbranched aliphatic; cyclic or acyclic, substituted or unsubstituted, branched or unbranched heteroaliphatic; substituted or unsubstituted, branched or unbranched acyl; substituted or unsubstituted aryl; substituted or unsubstituted heteroaryl; alkoxy; aryloxy; alkylthio; arylthio; amino; alkylamino; dialkylamino; heteroaryloxy; heteroarylthio and a protecting group; or $R_{1'}$ and $R_{2'}$ form a cyclic structure; provided that the composition and method do not employ a free radical initiator, a polymerization initiator or a polymerization catalyst.

2. The method according to claim 1, wherein the compound is selected from the group consisting of

2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl dimethacrylate;

2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl diacrylate;

1H,1H,11H-eicosafluoroundecyl acrylate;

1H,1H,11H-eicosafluoroundecyl methacrylate;

2,2,3,3,4,4,5,5-octafluoropentyl methacrylate;

2,2,3,3,4,4,5,5-octafluoropentyl acrylate;

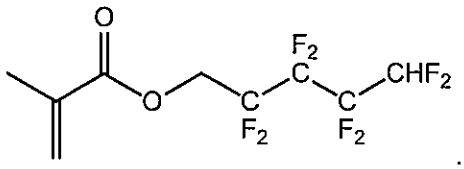
2,2,3,3,4,4-hexafluoro-1,5-pentyl diacrylate;

2,2,3,3,4,4-hexafluoro-1,5-pentyl dimethacrylate;

1H,1H,7H-dodecafluoroheptyl acrylate; and

1H,1H,7H-dodecafluoroheptyl methacrylate.

3. The method according to claim 1, wherein the compound is:



4. The method according to claim 1, wherein the compound does not substantially polymerize on the hair.

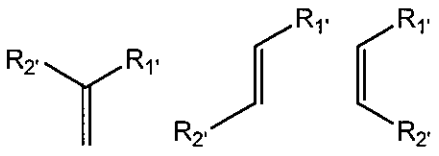
5. The method according to claim 1, wherein said method does not employ a step consisting of rinsing said hair after applying said composition.

6. The method according to claim 1, wherein said composition is a hair spray, conditioner, or shampoo.

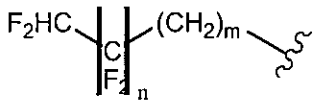
7. The method according to claim 1, wherein the method does not further employ a step of (i) applying a composition containing more than about 0.1% weight/weight of a uv-activated free radical initiator that is activated under ambient light, or (ii) applying a composition containing more than about 0.01% weight/weight of a free radical initiator selected from the group consisting of a heat-activated initiator that is activated at or above ambient temperature and an initiator that is active at ambient temperature.

8. A non-toxic hair care composition comprising a fluorinated, non-polymeric compound of formula (I) and a cosmetically acceptable excipient,

wherein the compound is according to one of the formulae:



wherein $R_{1'}$ is $-CO_2R_{A'}$; and wherein $R_{A'}$ is



wherein n is an integer between 0 and 20, inclusive; and m is an even or odd integer between 1 and 6, inclusive; and

$R_{2'}$ is selected from the group consisting of hydrogen; halogen; cyclic or acyclic, substituted or unsubstituted, branched or unbranched aliphatic; cyclic or acyclic, substituted or unsubstituted, branched or unbranched heteroaliphatic; substituted or unsubstituted, branched or unbranched acyl; substituted or unsubstituted aryl; substituted or unsubstituted heteroaryl; $-OR_{A'}$; $-C(O)R_{A'}$; $-CO_2R_{A'}$; $-C(O)N(R_{A'})_2$; $-SR_{A'}$; $-SOR_{A'}$; $-SO_2R_{A'}$; $-NR_{A'}$; $-N(R_{A'})_2$; $-NHC(O)R_{A'}$; and $-C(R_{A'})_3$; and wherein each occurrence of $R_{A'}$ is independently selected from a group consisting of hydrogen, cyclic or acyclic, substituted or unsubstituted, branched or unbranched aliphatic; cyclic or acyclic, substituted or unsubstituted, branched or unbranched heteroaliphatic; substituted or unsubstituted, branched or unbranched acyl; substituted or unsubstituted aryl; substituted or unsubstituted heteroaryl; alkoxy; aryloxy; alkylthio; arylthio; amino; alkylamino; dialkylamino; heteroaryloxy; heteroarylthio and a protecting group; or $R_{1'}$ and $R_{2'}$ form a cyclic structure; provided that the composition does not contain a free radical initiator, a polymerization initiator or a polymerization catalyst.

9. The hair care composition according to claim 8, wherein the cosmetically acceptable excipient comprises a rheology modifier and a non-ionic emulsifier, wherein the rheology modifier is selected from the group consisting of gyceryl polyacrylate, sodium polyacrylate, carbomer, acrylates copolymer, acrylic acid/vp crosspolymer, and xanthan gum; and the non-ionic emulsifier is selected from the group consisting of Laureth-23, Ocyldodeceth-20, Oleth-10, Peg-40 Hydrogenated Castor Oil, Polaxomer 127, Polysorbate 20, and Ceteareth-20.

10. The hair care composition according to claim 8, wherein the compound is selected from the group consisting of

2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl dimethacrylate;

2,2,3,3,4,4,5,5-octafluoro-1,6-hexyl diacrylate;

1H,1H,11H-eicosafluoroundecyl acrylate;

1H,1H,11H-eicosafluoroundecyl methacrylate;

2,2,3,3,4,4,5,5-octafluoropentyl methacrylate;

2,2,3,3,4,4,5,5-octafluoropentyl acrylate;

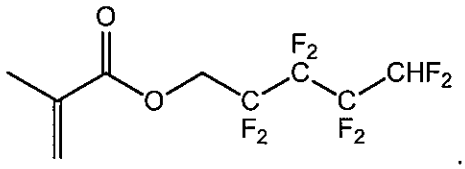
2,2,3,3,4,4-hexafluoro-1,5-pentyl diacrylate;

2,2,3,3,4,4-hexafluoro-1,5-pentyl dimethacrylate;

1H,1H,7H-dodecafluoroheptyl acrylate; and

1H,1H,7H-dodecafluoroheptyl methacrylate.

11. The hair care composition according to claim 8, wherein the compound is:



12. The hair care composition according to claim 8, wherein the composition is a hair spray, conditioner, or shampoo.

13. A method as claimed in any one of claims 1 to 7 for treating scalp hair comprising the step of applying to hair a non-toxic composition, wherein hair treated with the composition has at least 4 percent decreased moisture flux, resists dirt and has no more than 15 percent weight gain and the composition has at least 50 percent weight loss.