CLAIMS

1. A polymerizable composition comprising:

at least one polymerizable compound;

at least one non-reactive, solvent-dissolvable polymer; and

at least one non-reactive solvent;

wherein upon exposure to a polymerization accelerant, said polymerizable composition cures to an acrylic thermoset having voids defined therein.

2. The polymerizable composition according to Claim 1, wherein said at least one polymerizable compound is a (meth)acrylate.

3. The polymerizable composition according to Claim 1, further comprising at least one urethane (meth)acrylate.

4. The polymerizable composition according to Claim 1, further comprising at least one compound selected from the group consisting of polypropylene glycol monomethacrylates, polyethylene glycol monomethacrylates, and mixtures thereof.

5. The polymerizable composition according to Claim 1, wherein said polymerization accelerant is selected from the group consisting of thermal conduction and/or radiation, visible radiation, UV radiation, electron beam radiation, amines, peroxides, and combinations thereof.

6. The polymerizable composition of Claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is a cellulose ester.

7. The polymerizable composition of Claim 2, wherein said cellulose ester is a cellulose acetate alkylate.

8 The polymerizable composition of Claim 3, wherein said cellulose acetate alkylate is selected from the group consisting of cellulose acetate butyrate, cellulose acetate propionate, and mixtures thereof.

9. The polymerizable composition of Claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 5 to about 70 wt%.

10. The polymerizable composition of Claim 5, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 10 to about 60 wt%.

11. The polymerizable composition of Claim 5, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 20 to about 50 wt%.

12. The polymerizable composition according to Claim 2, wherein said (meth)acrylate is selected from the group consisting of hydroxypropyl methacrylate, hydroxyethyl methacrylate, ethyl methacrylate, THFMA, pyromellitic dianhydride di(meth)acrylate, pyromellitic dianhydride glyceryl dimethacrylate, pyromellitic dimethacrylate, methacroyloxyethyl maleate, 2-hydroxyethyl methacrylate/succinate,1,3-glycerol dimethacrylate/succinate adduct, phthalic acid monoethyl methacrylate, acetoacetoxy ethyl methacrylate, and mixtures thereof.

13. The polymerizable composition according to Claim 1, further comprising an adhesion-promoting (meth)acrylate.

14. The polymerizable composition according to Claim 13, wherein said adhesion-promoting (meth)acrylate is selected from the group consisting of tetrahydrofurfural methacrylate, ethyl methacrylate, hydroxypropyl methacrylate, pyromellitic dianhydride glyceryl dimethacrylate, and mixtures thereof.

15. The polymerizable composition according to Claim 1, further comprising pyromellitic glyceryl dimethacrylate.

16. The polymerizable composition of Claim 1, further comprising at least one colorant.

17. The polymerizable composition of Claim 16, wherein said at least one colorant is present at up to about 10 wt%.

18. The polymerizable composition of Claim 16, wherein said at least one colorant is selected from the group consisting of pigments and dyes.

19. The polymerizable composition of Claim 1, further comprising at least one rheology agent.

20. The polymerizable composition of Claim 19, wherein said at least one rheology agent is a fumed silica.

21. The polymerizable composition of Claim 20, wherein a surface of said fumed silica is modified with polydimethylsiloxane.

22. The polymerizable composition of Claim 19, wherein said at least one rheology agent is a polyamide.

23. The polymerizable composition of Claim 19, wherein said at least one rheology agent present at up to about 10 wt%.

24. The polymerizable composition of Claim 3, wherein said at least one at least one urethane (meth)acrylate has a molecular weight (grams/mole) of from about 100 to about 20,000.

25. The polymerizable composition of Claim 24, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 200 to about 10,000.

26. The polymerizable composition of Claim 25, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 5,000.

27. The polymerizable composition of Claim 26, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 1,000.

28. The polymerizable composition of Claim 1, wherein said at least one non-reactive solvent is selected from the group consisting of ketones, alkyl acetates, alcohols, alkanes, alkenes, and mixtures thereof.

29. The polymerizable composition of Claim 28, wherein said at least one non-reactive solvent is selected from the group consisting of acetone, ethyl acetate, butyl acetate, isopropyl alcohol, ethanol, methyl ethyl ketone, toluene, hexane, and mixtures thereof.

30. The polymerizable composition of Claim 29, wherein said at least one non-reactive solvent is acetone.

31. The polymerizable composition of Claim 1, wherein said at least one non-reactive solvent is included at up to about 70 weight percent.

32. The polymerizable composition of Claim 1, further comprising at least one photoinitiator.

33. The polymerizable composition of Claim 32, wherein said at least one photoinitiator is selected from the group consisting of benzoylphenylphosphinates, cyclohexylphenyl ketones, benzyl ketals, and mixtures thereof.

34. The polymerizable composition of Claim 33, wherein said at least one photoinitiator is selected from the group consisting of 2,4,6-trimethylbenzoyldiphenylphosphinate, hydroxycyclohexyl phenyl ketone, benzyl dimethyl ketal, and mixtures thereof.

35. The polymerizable composition of Claim 32, wherein said at least one photoinitiator is present at up to about 20 wt%.

36. The polymerizable composition of Claim 1, wherein at least a portion of said voids contain said at least one non-reactive, solvent-dissolvable polymer

37. An acrylic thermoset having a plurality of voids defined therein, wherein at least a portion of said voids contain at least one non-reactive, solvent-dissolvable polymer.

38. An acrylic thermoset having a plurality of voids defined therein, wherein at least a portion of said voids are formed around at least one non-reactive, solvent-dissolvable polymer.

39. An acrylic thermoset having a plurality of thermoplastic inclusions defined therein.

40. The polymerized thermoset having a plurality of thermoplastic inclusions according to Claim 39; said acrylic thermoset being the reaction product of a polymerizable composition comprising:

at least one polymerizable compound;

at least one non-reactive, solvent-dissolvable polymer; and

at least one non-reactive solvent.

41. The polymerized thermoset according to Claim 40, wherein said thermoplastic inclusions comprise said at least one non-reactive, solvent-dissolvable polymer.

42. A method of making a polymerized thermoset having a plurality of thermoplastic inclusions defined therein, comprising:

providing a polymerizable liquid composition; and,

exposing said polymerizable liquid composition to a polymerization accelerant;

wherein said polymerizable liquid composition comprises:

at least one polymerizable compound;

at least one non-reactive, solvent-dissolvable polymer; and

at least one non-reactive solvent.

CLAIMS

1. A polymerizable nail coating composition comprising:

at least one addition-polymerizable, ethylenically-unsaturated monomer;

at least one reactive urethane (meth)acrylate;

at least one plasticizer having the general structure RCO--OR' where RCO-- represents a carboxylic acid radical, where --OR' is an alcohol residue, and where R and R' are fatty radicals having 6 to 30 saturated or unsaturated carbon atoms;

at least one non-reactive, solvent-dissolvable polymer; and

at least one non-reactive solvent;

wherein upon exposure to a polymerization accelerant, said polymerizable composition cures to an acrylic thermoset having voids defined therein, and

wherein said nail coating comprises a sufficient amount of non-reactive, solvent-dissolvable polymer and non-reactive solvent such that, when cured to form an acrylic thermoset on the surface of a nail, the acrylic thermoset is removable from a nail surface within 20 minutes upon exposure to organic solvent.

2. The polymerizable composition according to claim 1, further comprising a reactive (meth)acrylate monomer or polymer selected from the group consisting of: hydroxyethylmethacrylate (HEMA), hydroxypropylmethacrylate (HPMA), ethyl methacrylate (EMA), tetrahydrofurfuryl methacrylate (THFMA), pyromellitic dianhydride di(meth)acrylate, pyromellitic dianhydride glyceryl dimethacrylate, pyromellitic dimethacrylate, methacroyloxyethyl maleate, 2-hydroxyethyl methacrylate/succinate, 1,3-glycerol dimethacrylate/succinate adduct, phthalic acid monoethyl methacrylate, acetoacetoxy ethyl methacylate (AAEMA), and mixtures thereof.

3. The polymerizable composition according to claim 1, wherein said polymerization accelerant is selected from the group consisting of thermal conduction and/or radiation, visible radiation, UV radiation, electron beam radiation, amines, peroxides, and combinations thereof.

4. The polymerizable composition of claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is a cellulose ester.

5. The polymerizable composition of claim 4, wherein said cellulose ester is a cellulose acetate alkylate.

6. The polymerizable composition of claim 5, wherein said cellulose acetate alkylate is

selected from the group consisting of cellulose acetate butyrate, cellulose acetate propionate, and mixtures thereof.

7. The polymerizable composition of claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 5 to about 70 wt %.

8. The polymerizable composition of claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 10 to about 60 wt %.

9. The polymerizable composition of claim 1, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 20 to about 50 wt %.

10. The polymerizable composition according to claim 1, further comprising an adhesion-promoting (meth)acrylate.

11. The polymerizable composition according to claim 10, wherein said adhesion-promoting (meth)acrylate is selected from the group consisting of tetrahydrofurfural methacrylate, ethyl methacrylate, hydroxypropyl methacrylate, pyromellitic dianhydride glyceryl dimethacrylate, and mixtures thereof.

12. The polymerizable composition according to claim 1, further comprising pyromellitic glyceryl dimethacrylate.

13. The polymerizable composition of claim 1, further comprising at least one colorant.

14. The polymerizable composition of claim 13, wherein said at least one colorant is present at up to about 10 wt %.

15. The polymerizable composition of claim 13, wherein said at least one colorant is selected from the group consisting of pigments and dyes.

16. The polymerizable composition of claim 1, further comprising at least one rheology agent.

17. The polymerizable composition of claim 16, wherein said at least one rheology agent is a fumed silica.

18. The polymerizable composition of claim 17, wherein a surface of said fumed silica is modified with polydimethylsiloxane.

19. The polymerizable composition of claim 16, wherein said at least one rheology agent is a polyamide.

20. The polymerizable composition of claim 16, wherein said at least one rheology agent present at up to about 10 wt %.

21. The polymerizable composition of claim 1, wherein said at least one urethane (meth)acrylate has a molecular weight (grams/mole) of from about 100 to about 20,000.

22. The polymerizable composition of claim 21, wherein said at least one urethane (meth)acrylate has a molecular weight of from about 200 to about 10,000.

23. The polymerizable composition of claim 22, wherein said at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 5,000.

24. The polymerizable composition of claim 23, wherein said at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 1,000.

25. The polymerizable composition of claim 1, wherein said at least one non-reactive solvent is selected from the group consisting of ketones, alkyl acetates, alcohols, alkanes, alkenes, and mixtures thereof.

26. The polymerizable composition of claim 25, wherein said at least one non-reactive solvent is selected from the group consisting of acetone, ethyl acetate, butyl acetate, isopropyl alcohol, ethanol, methyl ethyl ketone, toluene, hexane, and mixtures thereof.

27. The polymerizable composition of claim 26, wherein said at least one non-reactive solvent is acetone.

28. The polymerizable composition of claim 1, wherein said at least one non-reactive solvent is included at up to about 70 weight percent.

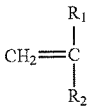
29. The polymerizable composition of claim 1, further comprising at least one photoinitiator.

30. The polymerizable composition of claim 29, wherein said at least one photoinitiator is selected from the group consisting of benzoylphenylphosphinates, cyclohexylphenyl ketones, benzyl ketals, and mixtures thereof.

31. The polymerizable composition of claim 30, wherein said at least one photoinitiator is selected from the group consisting of 2,4,6-trimethylbenzoyldiphenylphosphinate, hydroxycyclohexyl phenyl ketone, benzyl dimethyl ketal, and mixtures thereof.

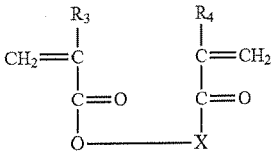
32. The polymerizable composition of claim 29, wherein said at least one photoinitiator is present at up to about 20 wt %.

33. The polymerizable composition of claim 1, wherein the ethylenically unsaturated monomer has the formula:



wherein R_1 is H, a C_{1-30} straight or branched chain alkyl, aryl, aralkyl; R_2 is a pyrrolidone, or a substituted or unsubstituted aromatic, alicyclic, or bicyclic ring where the substituents are C_{1-30} straight or branched chain alkyl, or COOM wherein M is H, a C_{1-30} straight or branched chain alkyl, pyrrolidone, or a substituted or unsubstituted aromatic, alicyclic, or bicyclic ring where the substituents are C_{1-30} straight or branched chain alkyl which may be substituted with one or more hydroxyl groups, or $[(CH_2)_mO]_nH$ wherein m is 1-20, and n is 1-200.

34. The polymerizable composition of claim 1, wherein the ethylenically unsaturated monomer is a difunctional monomer having the formula:



wherein R_3 and R_4 are each independently H, a C_{1-30} straight or branch chain alkyl, aryl, or aralkyl; and X is $[(CH_2)_xO_y]_z$ wherein x is 1-20, and y is 1-20, and z is 1-100.

35. The polymerizable composition of claim 1, wherein the ethylenically unsaturated monomer is selected from the group consisting of trifunctional acrylates, trifunctional methacrylates, polyfunctional acrylates and polyfunctional methacrylates.