CLAIMS

1. A polymerizable composition comprising:

at least one polymerizable compound;

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

at least one polyalkylene glycol mono(meth)acrylate; 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, wherein said at least one polyalkylene glycol mono(meth)acrylate is a 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 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 90 wt%.

10. The polymerizable composition of Claim 5, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 20 to about 80 wt%.

11. The polymerizable composition of Claim 5, wherein said at least one non-reactive, solvent-dissolvable polymer is present at from about 30 to about 70 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 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.

20. The polymerizable composition of Claim 19, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 200 to about 10,000.

21. The polymerizable composition of Claim 19, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 5,000.

22. The polymerizable composition of Claim 19, wherein said at least one at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 1,000.

23. 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.

24. The polymerizable composition of Claim 23, 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.

25. The polymerizable composition of Claim 24, wherein said at least one non-reactive solvent is acetone.

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

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

28. The polymerizable composition of Claim 27, wherein said at least one photoinitiator is selected from the group consisting of benzoylphenylphosphinates, cyclohexylphenyl ketones, benzyl ketals, and mixtures thereof.

29. The polymerizable composition of Claim 28, 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.

30. The polymerizable composition of Claim 27, wherein said at least one photoinitiator is present at up to about 20 wt%.

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

32. 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.

33. 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.

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

35. 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;

at least one polyalkylene glycol mono(meth)acrylate; and

at least one non-reactive solvent.

36. The polymerized thermoset according to Claim 35, wherein said thermoplastic inclusions comprise said at least one non-reactive, solvent-dissolvable polymer.

37. 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;

at least one polyalkylene glycol mono(meth)acrylate; and

at least one non-reactive solvent.

CLAIMS

1. A multilayer nail covering system comprising at least a first layer and a second layer,

wherein at least one of the first and second layer is curable to an acrylic thermoset lattice layer covering a nail surface upon exposure to actinic radiation;

wherein at least one of the first or second layer comprises:

hydroxypropyl methacrylate (HPMA),

at least one reactive urethane (meth)acrylate, and

a sufficient amount of a non-reactive, solvent-dissolvable polymer and a non-reactive solvent such that, when cured to the nail surface, the system is removable from the nail surface within 20 minutes of exposure to organic solvent.

2. The nail covering system of claim 1, wherein the at least one layer further comprises hydroxyethylmethacrylate (HEMA).

3. The nail covering system of claim 1, wherein said non-reactive, solvent-dissolvable polymer is a cellulose ester.

4. The nail covering system of claim 3, wherein said cellulose ester is a cellulose acetate alkylate.

5. The nail covering system of claim 4, wherein said cellulose acetate alkylate is selected from the group consisting of cellulose acetate butyrate, cellulose acetate propionate, and mixtures thereof.

6. The nail covering system of claim 1, wherein said non-reactive solvent is selected from the group consisting of ketones, alkyl acetates, alcohols, alkanes, alkenes, and mixtures thereof.

7. The nail covering system of claim 1, wherein said 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.

8. The nail covering system of claim 1, wherein the at least one layer further comprises at least one photoinitiator.

9. The nail covering system of claim 8, wherein said at least one photoinitiator is selected from the group consisting of benzoylphenylphosphinates, cyclohexylphenyl ketones, benzyl ketals, and mixtures thereof.

10. The nail covering system of claim 9, 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.

11. The nail covering system of claim 1, wherein the at least one layer further comprises at least one addition-polymerizable, ethylenically-unsaturated monomer.

12. The nail covering system of claim 1, wherein upon exposure to actinic radiation, the at least one layer cures to an acrylic thermoset lattice layer having voids defined therein, wherein at least a portion of said voids contain said at least one non-reactive, solvent-dissolvable polymer.

13. The nail covering system of claim 1, wherein said non-reactive, solvent-dissolvable polymer is present at from about 5 to about 90 wt %.

14. The nail covering system of claim 1, wherein said non-reactive, solvent-dissolvable polymer is present at from about 20 to about 80 wt %.

15. The nail covering system of claim 1, wherein said non-reactive, solvent-dissolvable polymer is present at from about 30 to about 70 wt %.

16. The nail covering system of claim 1, wherein the organic solvent is acetone.

17. The nail covering system according to claim 1, wherein the at least one layer further comprises an adhesion-promoting (meth)acrylate.

18. The nail covering system according to claim 17, wherein said adhesion-promoting (meth)acrylate is selected from the group consisting of tetrahydrofurfural methacrylate, ethyl methacrylate, pyromellitic dianhydride glyceryl dimethacrylate, and mixtures thereof.

19. The nail covering system according to claim 1, wherein the at least one layer further comprises pyromellitic glyceryl dimethacrylate.

20. The nail covering system according to claim 1, wherein the at least one layer further comprises at least one polyalkylene glycol mono(meth)acrylate.

21. The nail covering system according to claim 20, wherein said at least one polyalkylene glycol mono(meth)acrylate is a compound selected from the group consisting of polypropylene glycol monomethacrylates, polyethylene glycol monomethacrylates, and mixtures thereof.

22. The nail covering system of claim 1, wherein said at least one urethane (meth)acrylate has a molecular weight of from about 300 to about 1,000.

23. The nail covering system of claim 1, wherein the at least one layer further comprises 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.

24. The nail covering system according to claim 1, wherein the at least one layer further comprises a reactive (meth)acrylate monomer or polymer selected from the group consisting of: hydroxyethylmethacrylate (HEMA), 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.

25. The nail covering system according to claim 1, having a hardness of at least 3H on the pencil hardness test.

26. A nail covering system comprising: a basecoat layer; an intermediate layer; and a topcoat layer; wherein at least one layer comprises:

(a) hydroxypropyl methacrylate (HPMA);

(b) at least one reactive urethane (meth)acrylate;

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

(d) at least one non-reactive solvent; and

wherein, upon exposure to actinic radiation, the at least one layer cures to an acrylic thermoset lattice layer covering a nail surface.