CLAIMS

1. A process to produce an essentially homogeneous single liquid phase hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a diluent mixture, and unreacted monomer(s), the process comprising:
   (a) contacting the polymer slurry with a hydrocarbon solvent; and
   (b) removing the diluent and solvent in amounts not sufficiently more than is necessary to produce the essentially homogeneous single liquid phase hydrocarbon-rubber cement wherein the mass fraction of monomer(s) in the hydrocarbon-rubber cement, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber cement, is less than the mass fraction of monomer(s) in the hydrocarbon-rubber slurry, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber slurry,

   wherein the diluent mixture comprises a hydrofluorocarbon.
2. A process to produce an essentially homogeneous hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a diluent which is essentially free of a hydrofluorocarbon diluent, and a first mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the polymer slurry, comprising:
   (a) contacting the polymer slurry with a hydrofluorocarbon diluent and with a hydrocarbon solvent; and
   (b) removing at least a portion of the diluent and the hydrofluorocarbon diluent to produce the essentially homogeneous hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the essentially homogeneous hydrocarbon rubber cement,

   wherein the first mass fraction is greater than the second mass fraction.
3. A process for retrofitting an existing slurry cationic polymerization plant, the retrofitting process comprising the steps of:

(a) contacting a polymer slurry from the slurry cationic polymerization plant with a hydrocarbon solvent, the polymer slurry comprises a hydrocarbon-rubber, a diluent mixture, and a first mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the polymer slurry; and

(b) removing at least a portion of the diluent and solvent to produce an essentially homogeneous hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the essentially homogeneous hydrocarbon-rubber cement,

wherein the diluent mixture comprises a hydrofluorocarbon, and

wherein the first mass fraction is greater than the second mass fraction.

4. A process for retrofitting an existing slurry cationic polymerization plant, the retrofitting process comprising the steps of:

(a) contacting a polymer slurry from the slurry cationic polymerization plant with a hydrofluorocarbon diluent and with a hydrocarbon solvent, the polymer slurry comprises a hydrocarbon-rubber, a diluent which is essentially free of a hydrofluorocarbon diluent, and a first mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the polymer slurry;

(b) removing at least a portion of the diluent and the hydrofluorocarbon diluent to produce the essentially homogeneous hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the essentially homogeneous hydrocarbon rubber cement,

wherein the first mass fraction is greater than the second mass fraction.

5. A process to produce a single liquid phase hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a diluent mixture, and a first mass fraction of unreacted monomer(s) in the polymer slurry based on the total weight of the hydrocarbon-rubber in the polymer slurry, the process comprising:

(a) contacting the polymer slurry with a hydrocarbon solvent; and

(b) removing at least a portion of the diluent and solvent from the polymer slurry to produce the single liquid phase hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) in the hydrocarbon-rubber cement, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber cement,

wherein the diluent mixture comprises a hydrofluorocarbon and the first mass fraction is higher than the second mass fraction.

6. The process of any one of claims 1 to 5, wherein the hydrofluorocarbon comprises at least one carbon atom, and at least two fluorine atoms.

7. The process of any one of claims 1 to 6, wherein the hydrofluorocarbon comprises 1,1-difluoroethane.

8. The process of any one of claims 1 to 7, wherein the hydrofluorocarbon comprises 1,1,1,2-tetrafluoroethane.

9. The process of any one of claims 1 to 8, wherein the hydrofluorocarbon consists essentially of hydrogen, carbon, and fluorine.

10. The process of any one of claims 1 to 9, wherein the mass fraction of the unreacted monomer(s) in the hydrocarbon-cement, based on the total weight of the hydrocarbon rubber in the hydrocarbon-cement, is less than the mass fraction of the unreacted monomer(s) in the polymer slurry, based on the total weight of the hydrocarbon rubber in the polymer slurry.

11. The process of any one of claims 1 to 10, wherein the diluent or diluent mixture comprises methyl chloride.

12. The process of any one of claims 1 to 11, wherein the hydrocarbon-rubber comprises polymer(s) and/or copolymer(s) of isobutylene, isoprene, para-methyl styrene, or a combination thereof.

13. The process of any one of claims 1 to 12, wherein the diluent or diluent mixture consists of the hydrofluorocarbon and 5 to 70 wt% methyl chloride.

14. The process of any one of claims 1 to 13, wherein the polymer slurry is produced in a slurry cationic polymerization process for the production of C_4-C_7 isoolefin polymers.

15. The process of any one of claims 1 to 14, wherein the polymer slurry comprises greater than or equal to about 10 vol% solids.

16. The process of any one of claims 1 to 15, wherein the polymer slurry is at a temperature of less than or equal to about –20°C when contacted with the hydrocarbon solvent.

17. The process of any one of claims 1 to 16, wherein the mass fraction of the unreacted monomer(s) in the hydrocarbon-cement, based on the total weight of the hydrocarbon rubber in the hydrocarbon-cement, is less than 80% of the mass fraction of the unreacted monomer(s) in the polymer slurry, based on the total weight of the hydrocarbon rubber in the polymer slurry..

18. The process of any one of claims 1 to 17, wherein the hydrocarbon-rubber cement is essentially free of unreacted monomer(s).

19. The process of any one of claims 1 to 18, wherein the hydrofluorocarbon diluent is a gas at 25°C and a pressure of 101.3 kPa-a.

20. The process of any one of claims 1 to 19, wherein the hydrofluorocarbon is represented by the formula:

$$C_xH_yF_z$$

wherein x is an integer from 1 to 10, y is greater than or equal to 1; and z is greater than or equal to 1.

21. The process of any one of claims 1 to 20, wherein the hydrofluorocarbon is selected from the group consisting of:

fluoromethane; difluoromethane; trifluoromethane; fluoroethane; 1,1-difluoroethane; 1,2-difluoroethane; 1,1,1-trifluoroethane; 1,1,2-trifluoroethane; 1,1,1,2-tetrafluoroethane; 1,1,2,2-tetrafluoroethane; 1,1,1,2,2-pentafluoroethane; 1,1,1-trifluoropropane; 1,1,2-trifluoropropane; 1,1,3-trifluoropropane; 1,2,2-trifluoropropane; 1,2,3-trifluoropropane; 1,1,1,2-tetrafluoropropane; 1,1,1,3-tetrafluoropropane; 1,1,2,2-tetrafluoropropane; 1,1,2,3-tetrafluoropropane; 1,1,3,3-tetrafluoropropane; 1,2,2,3-tetrafluoropropane; 1,1,1,2,2-pentafluoropropane; 1,1,1,2,3-pentafluoropropane; 1,1,1,3,3-pentafluoropropane; 1,1,2,2,3-

pentafluoropropane; 1,1,2,3,3-pentafluoropropane; 1,1,1,2,2,3-hexafluoropropane; 1,1,1,2,3,3-hexafluoropropane; 1,1,1,3,3,3-hexafluoropropane; 1,1,1,2,2,3,3-heptafluoropropane; 1,1,1,2,3,3,3-heptafluoropropane; 1,1,1-trifluorobutane; 1,1,2-trifluorobutane; 1,1,3-trifluorobutane; 1,1,4-trifluorobutane; 1,2,2-trifluorobutane; 1,2,3-trifluorobutane; 1,3,3-trifluorobutane; 2,2,3-trifluorobutane; 1,1,1,2-tetrafluorobutane; 1,1,1,3-tetrafluorobutane; 1,1,1,4-tetrafluorobutane; 1,1,2,2-tetrafluorobutane; 1,1,2,3-tetrafluorobutane; 1,1,2,4-tetrafluorobutane; 1,1,3,3-tetrafluorobutane; 1,1,3,4-tetrafluorobutane; 1,1,4,4-tetrafluorobutane; 1,2,2,3-tetrafluorobutane; 1,2,2,4-tetrafluorobutane; 1,2,3,3-tetrafluorobutane; 1,2,3,4-tetrafluorobutane; 2,2,3,3-tetrafluorobutane; 1,1,1,2,2-pentafluorobutane; 1,1,1,2,3-pentafluorobutane; 1,1,1,2,4-pentafluorobutane; 1,1,1,3,3-pentafluorobutane; 1,1,1,3,4-pentafluorobutane; 1,1,1,4,4-pentafluorobutane; 1,1,2,2,3-pentafluorobutane; 1,1,2,2,4-pentafluorobutane; 1,1,2,3,3-pentafluorobutane; 1,1,2,4,4-pentafluorobutane; 1,1,3,3,4-pentafluorobutane; 1,2,2,3,3-pentafluorobutane; 1,2,2,3,4-pentafluorobutane; 1,1,1,2,2,3-hexafluorobutane; 1,1,1,2,2,4-hexafluorobutane; 1,1,1,2,3,3-hexafluorobutane, 1,1,1,2,3,4-hexafluorobutane; 1,1,1,2,4,4-hexafluorobutane; 1,1,1,3,3,4-hexafluorobutane; 1,1,1,3,4,4-hexafluorobutane; 1,1,1,4,4,4-hexafluorobutane; 1,1,2,2,3,3-hexafluorobutane; 1,1,2,2,3,4-hexafluorobutane; 1,1,2,2,4,4-hexafluorobutane; 1,1,2,3,3,4-hexafluorobutane; 1,1,2,3,4,4-hexafluorobutane; 1,2,2,3,3,4-hexafluorobutane; 1,1,1,2,2,3,3-heptafluorobutane; 1,1,1,2,2,4,4-heptafluorobutane; 1,1,1,2,2,3,4-heptafluorobutane; 1,1,1,2,3,3,4-heptafluorobutane; 1,1,1,2,3,4,4-heptafluorobutane; 1,1,1,2,4,4,4-heptafluorobutane; 1,1,1,3,3,4,4-heptafluorobutane; 1,1,1,2,2,3,3,4-octafluorobutane; 1,1,1,2,2,3,4,4-octafluorobutane; 1,1,1,2,3,3,4,4-octafluorobutane; 1,1,1,2,2,4,4,4-octafluorobutane; 1,1,1,2,3,4,4,4-octafluorobutane; 1,1,1,2,2,3,3,4,4-nonafluorobutane; 1,1,1,2,2,3,4,4,4-nonafluorobutane; 1,1,1-trifluoro-2-methylpropane; 1,1,3-trifluoro-2-methylpropane; 1,1,1,3-tetrafluoro-2-methylpropane; 1,1,3,3-tetrafluoro-2-methylpropane; 1,1,3-trifluoro-2-(fluoromethyl)propane; 1,1,1,3,3-pentafluoro-2-methylpropane; 1,1,3,3-tetrafluoro-2-

(fluoromethyl)propane; 1,1,1,3-tetrafluoro-2-(fluoromethyl)propane; 1,1,2-trifluorocyclobutane; 1,1,3-trifluorocyclobutane; 1,2,3-trifluorocyclobutane; 1,1,2,2-tetrafluorocyclobutane; 1,1,3,3-tetrafluorocyclobutane; 1,1,2,2,3-pentafluorocyclobutane; 1,1,2,3,3-pentafluorocyclobutane; 1,1,2,2,3,3-hexafluorocyclobutane; 1,1,2,2,3,4-hexafluorocyclobutane; 1,1,2,3,3,4-hexafluorocyclobutane; 1,1,2,2,3,3,4-heptafluorocyclobutane; 1,1,2-trifluoroethene; 1,1,2-trifluoropropene; 1,1,3-trifluoropropene; 1,2,3-trifluoropropene; 1,3,3-trifluoropropene; 2,3,3-trifluoropropene; 3,3,3-trifluoropropene; 1,1,2-trifluoro-1-butene; 1,1,3-trifluoro-1-butene; 1,1,4-trifluoro-1-butene; 1,2,3-trifluoro-1-butene; 1,2,4-trifluoro-1-butene; 1,3,3-trifluoro-1-butene; 1,3,4-trifluoro-1-butene; 1,4,4-trifluoro-1-butene; 2,3,3-trifluoro-1-butene; 2,3,4-trifluoro-1-butene; 2,4,4-trifluoro-1-butene; 3,3,4-trifluoro-1-butene; 3,4,4-trifluoro-1-butene; 4,4,4-trifluoro-1-butene; 1,1,2,3-tetrafluoro-1-butene; 1,1,2,4-tetrafluoro-1-butene; 1,1,3,3-tetrafluoro-1-butene; 1,1,3,4-tetrafluoro-1-butene; 1,1,4,4-tetrafluoro-1-butene; 1,2,3,3-tetrafluoro-1-butene; 1,2,3,4-tetrafluoro-1-butene; 1,2,4,4-tetrafluoro-1-butene; 1,3,3,4-tetrafluoro-1-butene; 1,3,4,4-tetrafluoro-1-butene; 1,4,4,4-tetrafluoro-1-butene; 2,3,3,4-tetrafluoro-1-butene; 2,3,4,4-tetrafluoro-1-butene; 2,4,4,4-tetrafluoro-1-butene; 3,3,4,4-tetrafluoro-1-butene; 3,4,4,4-tetrafluoro-1-butene; 1,1,2,3,3-pentafluoro-1-butene; 1,1,2,3,4-pentafluoro-1-butene; 1,1,2,4,4-pentafluoro-1-butene; 1,1,3,3,4-pentafluoro-1-butene; 1,1,3,4,4-pentafluoro-1-butene; 1,1,4,4,4-pentafluoro-1-butene; 1,2,3,3,4-pentafluoro-1-butene; 1,2,3,4,4-pentafluoro-1-butene; 1,2,4,4,4-pentafluoro-1-butene; 2,3,3,4,4-pentafluoro-1-butene; 2,3,4,4,4-pentafluoro-1-butene; 3,3,4,4,4-pentafluoro-1-butene; 1,1,2,3,3,4-hexafluoro-1-butene; 1,1,2,3,4,4-hexafluoro-1-butene; 1,1,2,4,4,4-hexafluoro-1-butene; 1,2,3,3,4,4-hexafluoro-1-butene; 1,2,3,4,4,4-hexafluoro-1-butene; 2,3,3,4,4,4-hexafluoro-1-butene; 1,1,2,3,3,4,4-heptafluoro-1-butene; 1,1,2,3,4,4,4-heptafluoro-1-butene; 1,1,3,3,4,4,4-heptafluoro-1-butene; 1,2,3,3,4,4,4-heptafluoro-1-butene; 1,1,1-trifluoro-2-butene; 1,1,2-trifluoro-2-butene; 1,1,3-trifluoro-2-butene; 1,1,4-trifluoro-2-butene; 1,2,3-trifluoro-2-butene; 1,2,4-trifluoro-2-butene; 1,1,1,2-tetrafluoro-2-butene; 1,1,1,3-

tetrafluoro-2-butene; 1,1,1,4-tetrafluoro-2-butene; 1,1,2,3-tetrafluoro-2-butene; 1,1,2,4-tetrafluoro-2-butene; 1,2,3,4-tetrafluoro-2-butene; 1,1,1,2,3-pentafluoro-2-butene; 1,1,1,2,4-pentafluoro-2-butene; 1,1,1,3,4-pentafluoro-2-butene; 1,1,1,4,4-pentafluoro-2-butene; 1,1,2,3,4-pentafluoro-2-butene; 1,1,2,4,4-pentafluoro-2-butene; 1,1,1,2,3,4-hexafluoro-2-butene; 1,1,1,2,4,4-hexafluoro-2-butene; 1,1,1,3,4,4-hexafluoro-2-butene; 1,1,1,4,4,4-hexafluoro-2-butene; 1,1,2,3,4,4-hexafluoro-2-butene; 1,1,1,2,3,4,4-heptafluoro-2-butene; 1,1,1,2,4,4,4-heptafluoro-2-butene; and mixtures thereof.

22. The process of any one of claims 1 to 21, wherein the hydrocarbon solvent comprises C_4-C_{10} hydrocarbons.

23. The process of any one of claims 1 to 22, wherein the hydrocarbon solvent comprises linear, branched, or cyclic C_5-C_8 hydrocarbons.

24. The process of any one of claims 1 to 23, wherein the hydrocarbon solvent comprises a C_5 to C_7 alkane.

25. The process of any one of claims 1 to 23, wherein the hydrocarbon solvent is selected from the group consisting of:

butane, cyclobutane, isobutane, n-pentane, cyclopentane, n-hexane, methycyclopentane, isohexane, 2-methylpentane, 3-methylpentane, 2-methylbutane, 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylhexane, 3-methylhexane, 3-ethylpentane, 2,2-dimethylpentane, 2,3-dimethylpentane, 2,4-dimethylpentane, 3,3-dimethylpentane, 2-methylheptane, 3-ethylhexane, 2,5-dimethylhexane, 2,24,-trimethylpentane, octane, heptane, nonane, decane, dodecane, undecane, 1,1-dimethylcycopentane, 1,2-dimethylcyclopentane, 1,3-dimethylcyclopentane, ethylcyclopentane, cyclohexane, methylcyclohexane, benzene, toluene, ortho-xylene, para-xylene, meta-xylene, and combinations thereof.

26. The process of any one of claims 1 to 23, wherein the hydrocarbon solvent is a mixture of n-hexane, 2-methylpentane, 3-methylpentane, methylcyclopentane, and/or cyclohexane.

27. The process of any one of claims 1 to 26, further comprising the steps of:

(c) removing at least a portion of the hydrofluorocarbon from the polymer slurry; and

(d) recycling at least a portion of the removed hydrofluorocarbon to produce additional polymer slurry.

28. The process of any one of claims 1 to 26, further comprising the steps of:

(c) removing at least a portion of the hydrocarbon solvent; and

(d) recycling at least a portion of the removed hydrocarbon solvent to produce additional polymer slurry.

29. The process of any one of claims 1 to 26, further comprising the steps of:

(c) removing at least a portion of the monomer(s); and

(d) recycling at least a portion of the removed monomer(s) to produce additional hydrocarbon-rubber.

30. The process of any one of claims 1 to 29, further comprising:
adjusting the temperature and/or the pressure of the polymer slurry or the mixture of the polymer slurry and the hydrocarbon solvent.

31. The process of any one of claims 1 to 30, further comprising:
adjusting the temperature, the pressure, the weight fraction of the hydrocarbon solvent in the resulting mixture, and/or the weight fraction of the diluent or diluent mixture in the resulting mixture so that the resulting mixture is maintained as substantially homogeneous liquid phase.

32. The process of any one of claims 1 to 31, wherein the polymer is an isobutylene/para-methyl styrene polymer or an isobutylene/isoprene copolymer.

33. A hydrocarbon-rubber cement composition made by a process of any one of claims 1 to 32.

CLAIMS:

1. A process to produce an essentially homogeneous single liquid phase hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a mixture of diluents, and unreacted monomer(s), the process comprising:

   (a) contacting the polymer slurry with a hydrocarbon solvent; and

   (b) removing the diluent and solvent in amounts not more than is necessary to produce the essentially homogeneous single liquid phase hydrocarbon-rubber cement wherein the mass fraction of monomer(s) in the hydrocarbon-rubber cement, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber cement, is less than the mass fraction of monomer(s) in the hydrocarbon-rubber slurry, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber slurry,

   wherein the diluent comprises a hydrofluorocarbon.

2. A process to produce an essentially homogeneous hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a diluent which is essentially free of a hydrofluorocarbon diluent, and a first mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the polymer slurry, comprising:

   (a) contacting the polymer slurry with a hydrofluorocarbon diluent and with a hydrocarbon solvent; and

   (b) removing at least a portion of the diluent, the hydrofluorocarbon diluent, and solvent to produce the essentially homogeneous hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) based on the total amount of hydrocarbon rubber present in the essentially homogeneous hydrocarbon rubber cement,

   wherein the first mass fraction is greater than the second mass fraction.

3. A process to produce a single liquid phase hydrocarbon-rubber cement from a polymer slurry comprising a hydrocarbon-rubber, a mixture of diluents, and a first mass fraction of unreacted monomer(s) in the polymer slurry based on the total weight of the hydrocarbon-rubber in the polymer slurry, the process comprising:

   (a) contacting the polymer slurry with a hydrocarbon solvent; and

(b) removing at least a portion of the diluent and solvent from the polymer slurry to produce the single liquid phase hydrocarbon-rubber cement having a second mass fraction of unreacted monomer(s) in the hydrocarbon-rubber cement, based on the total amount of hydrocarbon-rubber present in the hydrocarbon-rubber cement,

wherein the diluent comprises a hydrofluorocarbon and the first mass fraction is higher than the second mass fraction.

4. The process of any one of claims 1 to 3, wherein the hydrofluorocarbon comprises at least one carbon atom, and at least two fluorine atoms.

5. The process of any one of claims 1 to 4, wherein the hydrofluorocarbon comprises 1,1-difluoroethane.

6. The process of any one of claims 1 to 4, wherein the hydrofluorocarbon comprises 1,1,1,2-tetrafluoroethane.

7. The process of any one of claims 1 to 6, wherein the hydrofluorocarbon consists essentially of hydrogen, carbon, and fluorine.

8. The process of any one of claims 1 to 7, wherein the diluent further comprises methyl chloride.

9. The process of any one of claims 1 to 8, wherein the hydrocarbon-rubber comprises polymer(s) and/or copolymer(s) of isobutylene, isoprene, para-methyl styrene, or a combination thereof.

10. The process of any one of claims 1 to 9, wherein the diluent consists essentially of a hydrofluorocarbon.

11. The process of any one of claims 1 to 10, wherein the polymer slurry is produced in a slurry cationic polymerization process for the production of C_4-C_7 isoolefin polymers.

12. The process of any one of claims 1 to 11, wherein the polymer slurry comprises greater than or equal to about 10 vol% solids.

13. The process of any one of claims 1 to 12, wherein the polymer slurry is at a temperature of less than or equal to about –20°C when contacted with the hydrocarbon solvent.

14. The process of any one of claims 1 to 13, wherein the mass fraction of the unreacted monomer(s) in the hydrocarbon-cement, based on the total weight of the hydrocarbon rubber in the hydrocarbon-cement, is less than 80% of the mass fraction of the unreacted monomer(s) in the polymer slurry, based on the total weight of the hydrocarbon rubber in the polymer slurry.

15. The process of any one of claims 1 to 14, wherein the hydrocarbon-rubber cement is essentially free of unreacted monomer(s).

16. The process of any one of claims 1 to 15, wherein the hydrofluorocarbon diluent is a gas at 25°C and a pressure of 101.3 kPa.

17. The process of any one of claims 1 to 4 or 7 to 16, wherein the hydrofluorocarbon is represented by the formula:

$$C_xH_yF_z$$

wherein x is an integer from 1 to 10, y is greater than or equal to 1; and z is greater than or equal to 1.

18. The process of any one of claims 1 to 4 or 7 to 17, wherein the hydrofluorocarbon is:

fluoromethane; difluoromethane; trifluoromethane; fluoroethane; 1,1-difluoroethane; 1,2-difluoroethane; 1,1,1-trifluoroethane; 1,1,2-trifluoroethane; 1,1,1,2-tetrafluoroethane; 1,1,2,2-tetrafluoroethane; 1,1,1,2,2-pentafluoroethane; 1,1,1-trifluoropropane; 1,1,2-trifluoropropane; 1,1,3-trifluoropropane; 1,2,2-trifluoropropane; 1,2,3-trifluoropropane; 1,1,1,2-tetrafluoropropane; 1,1,1,3-tetrafluoropropane; 1,1,2,2-tetrafluoropropane; 1,1,2,3-tetrafluoropropane; 1,1,3,3-tetrafluoropropane; 1,2,2,3-tetrafluoropropane; 1,1,1,2,2-pentafluoropropane; 1,1,1,2,3-pentafluoropropane; 1,1,1,3,3-pentafluoropropane; 1,1,2,2,3-pentafluoropropane; 1,1,2,3,3-pentafluoropropane; 1,1,1,2,2,3-hexafluoropropane; 1,1,1,2,3,3-hexafluoropropane; 1,1,1,3,3,3-hexafluoropropane; 1,1,1,2,2,3,3-heptafluoropropane; 1,1,1,2,3,3,3-heptafluoropropane; 1,1,1-trifluorobutane; 1,1,2-trifluorobutane; 1,1,3-trifluorobutane; 1,1,4-trifluorobutane; 1,2,2-trifluorobutane; 1,2,3-trifluorobutane; 1,3,3-trifluorobutane; 2,2,3-trifluorobutane; 1,1,1,2-tetrafluorobutane; 1,1,1,3-tetrafluorobutane; 1,1,1,4-tetrafluorobutane; 1,1,2,2-tetrafluorobutane; 1,1,2,3-tetrafluorobutane; 1,1,2,4-tetrafluorobutane; 1,1,3,3-tetrafluorobutane; 1,1,3,4-tetrafluorobutane; 1,1,4,4-tetrafluorobutane; 1,2,2,3-tetrafluorobutane; 1,2,2,4-tetrafluorobutane; 1,2,3,3-tetrafluorobutane; 1,2,3,4-tetrafluorobutane; 2,2,3,3-tetrafluorobutane; 1,1,1,2,2-pentafluorobutane; 1,1,1,2,3-pentafluorobutane; 1,1,1,2,4-pentafluorobutane; 1,1,1,3,3-pentafluorobutane; 1,1,1,3,4-pentafluorobutane; 1,1,1,4,4-pentafluorobutane; 1,1,2,2,3-pentafluorobutane; 1,1,2,2,4-pentafluorobutane; 1,1,2,3,3-pentafluorobutane; 1,1,2,4,4-pentafluorobutane; 1,1,3,3,4-pentafluorobutane; 1,2,2,3,3-pentafluorobutane; 1,2,2,3,4-pentafluorobutane; 1,1,1,2,2,3-hexafluorobutane; 1,1,1,2,2,4-hexafluorobutane; 1,1,1,2,3,3-

hexafluorobutane, 1,1,1,2,3,4-hexafluorobutane; 1,1,1,2,4,4-hexafluorobutane; 1,1,1,3,3,4-hexafluorobutane; 1,1,1,3,4,4-hexafluorobutane; 1,1,1,4,4,4-hexafluorobutane; 1,1,2,2,3,3-hexafluorobutane; 1,1,2,2,3,4-hexafluorobutane; 1,1,2,2,4,4-hexafluorobutane; 1,1,2,3,3,4-hexafluorobutane; 1,1,2,3,4,4-hexafluorobutane; 1,2,2,3,3,4-hexafluorobutane; 1,1,1,2,2,3,3-heptafluorobutane; 1,1,1,2,2,4,4-heptafluorobutane; 1,1,1,2,2,3,4-heptafluorobutane; 1,1,1,2,3,3,4-heptafluorobutane; 1,1,1,2,3,4,4-heptafluorobutane; 1,1,1,2,4,4,4-heptafluorobutane; 1,1,1,3,3,4,4-heptafluorobutane; 1,1,1,2,2,3,3,4-octafluorobutane; 1,1,1,2,2,3,4,4-octafluorobutane; 1,1,1,2,3,3,4,4-octafluorobutane; 1,1,1,2,2,4,4,4-octafluorobutane; 1,1,1,2,3,4,4,4-octafluorobutane; 1,1,1,2,2,3,3,4,4-nonafluorobutane; 1,1,1,2,2,3,4,4,4-nonafluorobutane; 1,1,1-trifluoro-2-methylpropane; 1,1,3-trifluoro-2-methylpropane; 1,1,1,3-tetrafluoro-2-methylpropane; 1,1,3,3-tetrafluoro-2-methylpropane; 1,1,3-trifluoro-2-(fluoromethyl)propane; 1,1,1,3,3-pentafluoro-2-methylpropane; 1,1,3,3-tetrafluoro-2-(fluoromethyl)propane; 1,1,1,3-tetrafluoro-2-(fluoromethyl)propane; 1,1,2-trifluorocyclobutane; 1,1,3-trifluorocyclobutane; 1,2,3-trifluorocyclobutane; 1,1,2,2-tetrafluorocyclobutane; 1,1,3,3-tetrafluorocyclobutane; 1,1,2,2,3-pentafluorocyclobutane; 1,1,2,3,3-pentafluorocyclobutane; 1,1,2,2,3,3-hexafluorocyclobutane; 1,1,2,2,3,4-hexafluorocyclobutane; 1,1,2,3,3,4-hexafluorocyclobutane; 1,1,2,2,3,3,4-heptafluorocyclobutane; 1,1,2-trifluoroethene; 1,1,2-trifluoropropene; 1,1,3-trifluoropropene; 1,2,3-trifluoropropene; 1,3,3-trifluoropropene; 2,3,3-trifluoropropene; 3,3,3-trifluoropropene; 1,1,2-trifluoro-1-butene; 1,1,3-trifluoro-1-butene; 1,1,4-trifluoro-1-butene; 1,2,3-trifluoro-1-butene; 1,2,4-trifluoro-1-butene; 1,3,3-trifluoro-1-butene; 1,3,4-trifluoro-1-butene; 1,4,4-trifluoro-1-butene; 2,3,3-trifluoro-1-butene; 2,3,4-trifluoro-1-butene; 2,4,4-trifluoro-1-butene; 3,3,4-trifluoro-1-butene; 3,4,4-trifluoro-1-butene; 4,4,4-trifluoro-1-butene; 1,1,2,3-tetrafluoro-1-butene; 1,1,2,4-tetrafluoro-1-butene; 1,1,3,3-tetrafluoro-1-butene; 1,1,3,4-tetrafluoro-1-butene; 1,1,4,4-tetrafluoro-1-butene; 1,2,3,3-tetrafluoro-1-butene; 1,2,3,4-tetrafluoro-1-butene; 1,2,4,4-tetrafluoro-1-butene; 1,3,3,4-tetrafluoro-1-butene; 1,3,4,4-tetrafluoro-1-butene; 1,4,4,4-tetrafluoro-1-butene; 2,3,3,4-tetrafluoro-1-butene; 2,3,4,4-tetrafluoro-1-butene; 2,4,4,4-tetrafluoro-1-butene; 3,3,4,4-tetrafluoro-1-butene; 3,4,4,4-tetrafluoro-1-butene; 1,1,2,3,3-pentafluoro-1-butene; 1,1,2,3,4-pentafluoro-1-butene; 1,1,2,4,4-pentafluoro-1-butene; 1,1,3,3,4-pentafluoro-1-butene; 1,1,3,4,4-pentafluoro-1-butene; 1,1,4,4,4-pentafluoro-1-butene; 1,2,3,3,4-pentafluoro-1-butene; 1,2,3,4,4-pentafluoro-1-butene; 1,2,4,4,4-pentafluoro-1-butene;

2,3,3,4,4-pentafluoro-1-butene; 2,3,4,4,4-pentafluoro-1-butene; 3,3,4,4,4-pentafluoro-1-butene; 1,1,2,3,3,4-hexafluoro-1-butene; 1,1,2,3,4,4-hexafluoro-1-butene; 1,1,2,4,4,4-hexafluoro-1-butene; 1,2,3,3,4,4-hexafluoro-1-butene; 1,2,3,4,4,4-hexafluoro-1-butene; 2,3,3,4,4,4-hexafluoro-1-butene; 1,1,2,3,3,4,4-heptafluoro-1-butene; 1,1,2,3,4,4,4-heptafluoro-1-butene; 1,1,3,3,4,4,4-heptafluoro-1-butene; 1,2,3,3,4,4,4-heptafluoro-1-butene; 1,1,1-trifluoro-2-butene; 1,1,2-trifluoro-2-butene; 1,1,3-trifluoro-2-butene; 1,1,4-trifluoro-2-butene; 1,2,3-trifluoro-2-butene; 1,2,4-trifluoro-2-butene; 1,1,1,2-tetrafluoro-2-butene; 1,1,1,3-tetrafluoro-2-butene; 1,1,1,4-tetrafluoro-2-butene; 1,1,2,3-tetrafluoro-2-butene; 1,1,2,4-tetrafluoro-2-butene; 1,2,3,4-tetrafluoro-2-butene; 1,1,1,2,3-pentafluoro-2-butene; 1,1,1,2,4-pentafluoro-2-butene; 1,1,1,3,4-pentafluoro-2-butene; 1,1,1,4,4-pentafluoro-2-butene; 1,1,2,3,4-pentafluoro-2-butene; 1,1,2,4,4-pentafluoro-2-butene; 1,1,1,2,3,4-hexafluoro-2-butene; 1,1,1,2,4,4-hexafluoro-2-butene; 1,1,1,3,4,4-hexafluoro-2-butene; 1,1,1,4,4,4-hexafluoro-2-butene; 1,1,2,3,4,4-hexafluoro-2-butene; 1,1,1,2,3,4,4-heptafluoro-2-butene; 1,1,1,2,4,4,4-heptafluoro-2-butene; or a mixture thereof.

19. The process of any one of claims 1 to 18, wherein the hydrocarbon solvent comprises C_4-C_{10} hydrocarbons.

20. The process of any one of claims 1 to 19, wherein the hydrocarbon solvent comprises linear, branched, or cyclic C_5-C_8 hydrocarbons.

21. The process of any one of claims 1 to 20, wherein the hydrocarbon solvent comprises a C_5 to C_7 alkane.

22. The process of any one of claims 1 to 19, wherein the hydrocarbon solvent is:

butane, cyclobutane, isobutane, n-pentane, cyclopentane, n-hexane, methycyclopentane, isohexane, 2-methylpentane, 3-methylpentane, 2-methylbutane, 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylhexane, 3-methylhexane, 3-ethylpentane, 2,2-dimethylpentane, 2,3-dimethylpentane, 2,4-dimethylpentane, 3,3-dimethylpentane, 2-methylheptane, 3-ethylhexane, 2,5-dimethylhexane, 2, 2,4,-trimethylpentane, octane, heptane, nonane, decane, dodecane, undecane, 1,1-dimethylcycopentane, 1,2-dimethylcyclopentane, 1,3-dimethylcyclopentane, ethylcyclopentane, cyclohexane, methylcyclohexane, benzene, toluene, ortho-xylene, para-xylene, meta-xylene, or a combination thereof.

23. The process of any one of claims 1 to 22, wherein the hydrocarbon solvent is a mixture of n-hexane, 2-methylpentane, 3-methylpentane, methylcyclopentane, and/or cyclohexane.

24. The process of any one of claims 1 to 23, further comprising the steps of:
    (c) removing at least a portion of the hydrofluorocarbon from the polymer slurry; and
    (d) recycling at least a portion of the removed hydrofluorocarbon to produce additional polymer slurry.

25. The process of any one of claims 1 to 24, further comprising the steps of:
    (c) removing at least a portion of the hydrocarbon solvent; and
    (d) recycling at least a portion of the removed hydrocarbon solvent to produce additional polymer slurry.

26. The process of any one of claims 1 to 25, further comprising the steps of:
    (c) removing at least a portion of the monomer(s); and
    (d) recycling at least a portion of the removed monomer(s) to produce additional hydrocarbon-rubber.