CLAIMS

1. A copolymer of at least one isoolefin monomer and at least one multiolefin monomer and/or β-pinene monomer, the copolymer being produced by contacting the at least one isoolefin monomer with the at least one multiolefin and/or the β-pinene monomer in a diluent comprising 1,3,3,3-tetrafluoro-1-propene (HFO-1234ze), 2,3,3,3-tetrafluoro-1-propene (HFO-1234yf) or mixtures thereof, and the copolymer having an isoprenoid content lower than an isoprenoid content of a comparable polymer produced in a butyl rubber slurry process using 1,1,1,2-tetrafluoroethane as a diluent.

2. The copolymer according to claim 1, wherein the isoprenoid content is less than 15% based on total unsaturations in the copolymer.

3. The copolymer according to claim 1, wherein the contacting is done in the presence of at least one Lewis acid and at least one initiator at a temperature of less than or equal to -75° C.

4. The copolymer according to claim 1, wherein the diluent comprises 2,3,3,3-tetrafluoro-1-propene (HFO-1234yf).

5. The copolymer according to claim 1, wherein the at least one isoolefin monomer comprises an isoolefin having from 4 to 16 carbon atoms or preferably 4 to 7 carbon atoms.

6. The copolymer according to claim 1, wherein the at least one isoolefin monomer comprises isobutene, 2-methyl-1-butene, 3-methyl-1-butene, 2-methyl-2-butene, 4-methyl-1-pentene or mixtures thereof.

7. The copolymer according to claim 1, wherein the at least one multiolefin and/or β-pinene monomer comprises a multiolefin having from 4-14 carbon atoms.

8. The copolymer according to claim 1, wherein the at least one multiolefin and/or β-pinene monomer comprises isoprene, butadiene, 2-methylbutadiene, 2,4-dimethylbutadiene, piperyline, 3-methyl-1,3-pentadiene, 2,4-hexadiene, 2-neopentylbutadiene, 2-methyl-1,5-hexadiene, 2,5-dimethyl-2,4-hexadiene, 2-methyl-1,4-pentadiene, 2-methyl-1,6-heptadiene, cyclopentadiene, methylcyclopentadiene, cyclohexadiene, 1-vinyl-cyclohexadiene or

mixtures thereof.

9. The copolymer according to claim 1, wherein:

the at least one isoolefin monomer comprises isobutene, 2-methyl-1-butene, 3-methyl-1-butene, 2-methyl-2-butene, 4-methyl-1-pentene, or mixtures thereof;

the at least one multiolefin and/or β-pinene monomer comprises isoprene, butadiene, 2-methylbutadiene, 2,4-dimethylbutadiene, piperyline, 3-methyl-1,3-pentadiene, 2,4-hexadiene, 2-neopentylbutadiene, 2-methyl-1,5-hexadiene, 2,5-dimethyl-2,4-hexadiene, 2-methyl-1,4-pentadiene, 2-methyl-1,6-heptadiene, cyclopentadiene, methylcyclopentadiene, cyclohexadiene, 1-vinyl-cyclohexadiene, or mixtures thereof;

the isoprenoid content is less than 6% based on total unsaturations in the copolymer;

the copolymer is produced by contacting the at least one isoolefin monomer with the at least one multiolefin and/or the β-pinene monomer in the presence of at least one Lewis acid and at least one initiator in the diluent at a temperature of less than or equal to -95° C., wherein:

the diluent comprises 2,3,3,3-tetrafluoro-1-propene (HFO-1234yf);

the at least one Lewis acid is selected from a group consisting of ethyl aluminum dichloride (EADC), diethyl aluminum chloride (DEAC), titanium tetrachloride, stannous tetrachloride, boron trifluoride, boron trichloride, methylalumoxane, and mixtures thereof; and

the at least one initiator comprises a cationogen and/or a proton source selected from a group consisting of water, hydrochloric acid (HCl), alcohol, phenol, thiols, carboxylic acids and mixtures thereof.

10. The copolymer according to claim 1, wherein the isoprenoid content is less than 12% based on total unsaturations in the copolymer.

11. The copolymer according to claim 1, wherein the isoprenoid content is less than 11% based on total unsaturations in the copolymer.

12. The copolymer according to claim 1, wherein the isoprenoid content is less than 6% based on total unsaturations in the copolymer.